Doctorate in Clinical Psychology

The impact of experiential avoidance on reduced positive emotional responsivity in post traumatic stress disorder

Part 1: Literature Review:

Part 2: Empirical paper:

Submitted by Claudia Catarina Copestake, to the University of Exeter as a thesis for the degree of Doctor of Clinical Psychology, May 2014

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Part 1. Literature Review

The impact of experiential avoidance on emotional responsivity in post traumatic stress disorder (PTSD).

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Abstract

This review examines recent research identified from a literature search to explore emotion responsivity in PTSD, by firstly providing an overview of clinical features and models of PTSD, to ascertain current understanding of the role of emotion regulation in PTSD. The review then continues to explore the link between emotion regulation and emotional responsivity deficits in PTSD, recognising that there is little known about positive emotional responsivity deficits, i.e. emotional numbing symptoms. Possible mechanisms driving reduced positive affective experiences in PTSD are presented, with experiential avoidance (the deliberate evasion of unpleasant internal experiences) suggested as a key underlying mechanism of emotional numbing. Research investigating the role of experiential avoidance in emotional numbing in the context of trauma is reviewed. Results indicated the substantial role that experiential avoidance (as an emotion regulation strategy) plays in overall psychological well-being and anhedonia in PTSD. However there was a dearth of research exploring causative mechanisms of experiential avoidance and altered emotional responsivity in PTSD. Finally, ways to elucidate our understanding of how emotional numbing symptoms in PTSD develop are suggested.

Highlights

- Our understanding of emotional responsivity deficits in PTSD is limited.
- Experiential avoidance is linked to PTSD onset, but remains unclear how it is related to anhedonia.

- Researchers are using experimental methods to examine possible underlying mechanisms.
- There exists a dearth of research around mechanisms driving anhedonia in PTSD.

Introduction

PTSD is a trauma and stress-related disorder resulting from a dangerous, life changing event characterised by distressing symptoms including re-experiencing (i.e. intrusive images, thoughts, flashbacks, and nightmares), avoidance and hyperarousal (American Psychiatric Association; APA, 2000). Emotional difficulties include irritability, anger, distress, and emotional numbing, which refers to a collection of PTSD symptoms including anhedonia, defined as the diminished interest in previously enjoyed activities, diminished positive affect and restricted emotional expression; Kring & Wernet, 2004). Research exploring these emotional difficulties in PTSD to date has typically focused on heightened negative affective experience. However, the evidence base has by comparison neglected to explore emotional numbing symptoms as a loss of general emotion experience, and more specifically anhedonia, referring to altered positive affective experience related to emotional numbing. These set of symptoms are disabling and distressing, and despite having been identified as predictors for impaired responses to treatment (Asmundson, Stapleton & Taylor, 2004), these emotional numbing symptoms have been theoretically and clinically neglected.'

In light of this recognised gap in the evidence base, recent years have seen a growing interest in what drives diminished positive affect in PTSD. Experiential avoidance (EA) defined as the effortful process to control, escape or avoid aversive private experiences (Hayes, 1994) has been highlighted as a possible mechanism linked to altered negative emotional reactivity in PTSD (Kashdan, Barrios, Forsyth & Steger, 2006). However, it remains unclear whether EA is also

responsible for reduced positive reactivity in PTSD. Therefore, investigating features of EA that may underlie altered positive emotion responsiveness would provide further insight into PTSD (Kashdan, Elhai & Frueh, 2007). Establishing our understanding of how EA contributes to anhedonia in the context of PTSD is the aim of this review.

Review Method

A literature review search was conducted in order to find articles that contribute to answering the question;

1. What is known about possible mechanisms of emotional numbing in PTSD, and what role does experiential avoidance play?

To locate relevant studies to answer this review question, computer searches using the major databases EBSCO, PsyInfo, PsyArticles and PubMed were used. When reading articles in the evidence base for PTSD, a range of terms and phrases were identified that encapsulated the concepts of the current study. Therefore, to ensure all relevant articles could be identified in the searches, different terms relating to emotion regulation strategies as well as the outcomes of such strategies and collection of symptoms identified in PTSD were chosen. This included the following search terms; *'experiential avoidance' or, 'emotional numbing', or 'anhedonia', or 'emotional responsiveness', or 'emotional avoidance', or 'emotion regulation', or 'emotional suppression', or 'emotion suppression' or 'avoidance', or 'numbing', or 'emotion responsivity', AND 'PTSD', or 'post traumatic stress disorder', or 'trauma', or 'traumatic material', or 'emotional distress', or 'trauma exposure' or 'chronic trauma' or 'post traumatic stress'* Reference lists of

all articles were also checked for additional articles. Inclusion criteria included clinical and non-clinical samples and research in the last 15 years. Exclusion criteria included dissertations, non-adult populations, and articles not written in English. A systematic search of the recent literature identified 24 suitable articles (including four from reference lists). Four articles that were dissertations and three articles including samples under 18 years were excluded (see Figure 1) leaving 17 articles reviewed (see Table 1). Detail extracted from these studies included design, population, sample size, type of analyses, conclusions, implications for the evidence base, and limitations which are presented in Table 1 by design (correlational, experimental) and population (e.g., clinical or non-clinical).

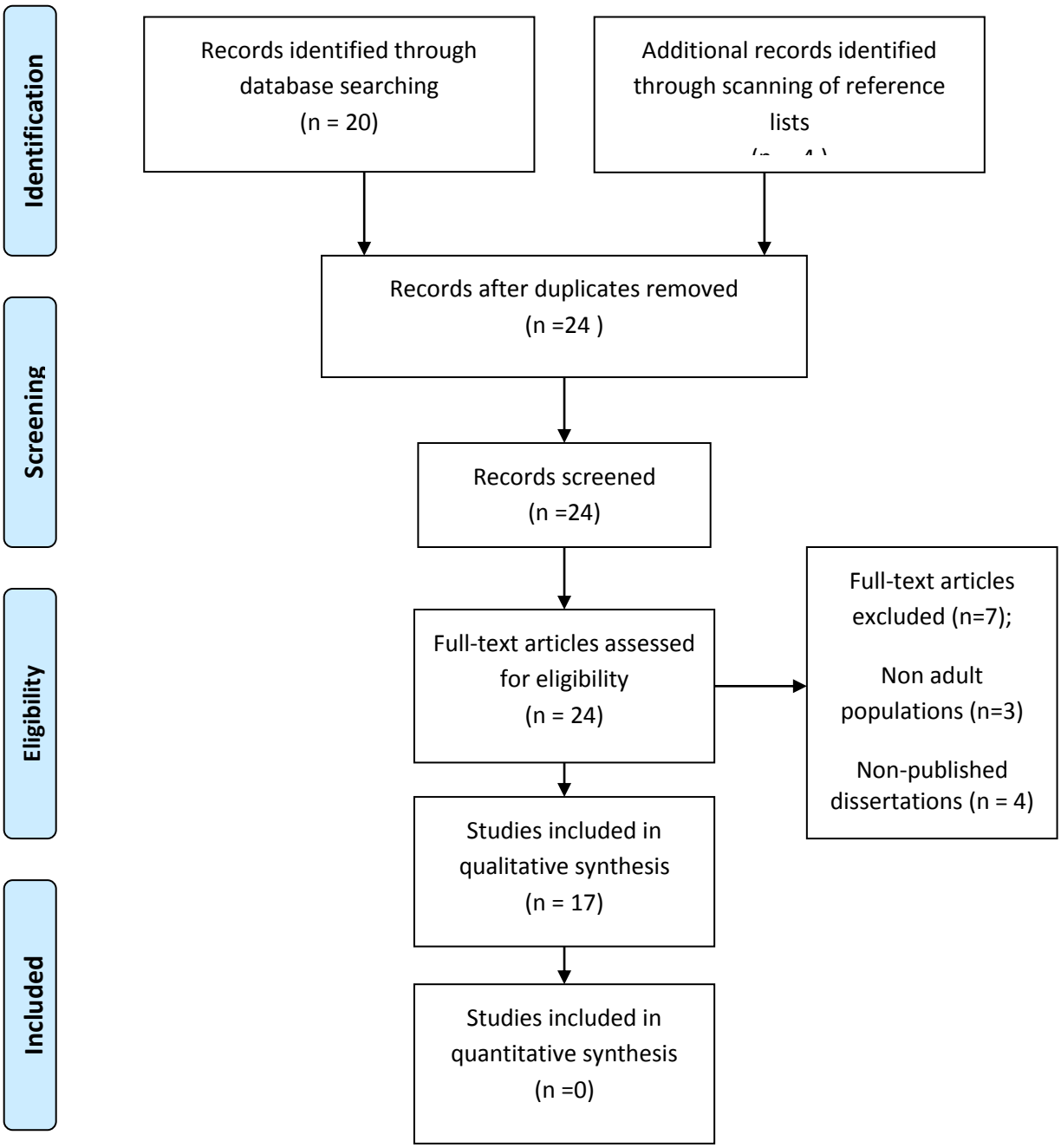

Figure 1. Flow diagram depicting the process of selecting relevant articles for the literature review.

Table 1.

Methodologies and features of studies identified from the literature search that met inclusion criteria ordered by design (correlational, experimental) and population (clinical or non-clinical).

STUDY TYPE	ARTICLE	METHODS	RESULTS	IMPLICATIONS	LIMITATIONS
Correlation studies with clinical samples	Tull, M. T., & Roemer, L. (2003). Alternative explanations for emotional numbing of posttraumatic stress disorder: An examination of hyperarousal and experiential avoidance.	• Sample of 170 female sexual abuse survivors in USA (mixed sample of abuse in childhood and/or adulthood) • Correlation analyses from self-report measures • Clinical sample	• Hyperarousal symptoms remained a significant predictor of emotional numbing when controlling for the relationship between emotional numbing and experiential avoidance • Hyperarousal symptoms predicted emotional numbing symptoms above and beyond experiential avoidance, and all other symptoms of PTSD[1]	• The relationship between hyperarousal and emotional numbing symptoms is not the result of the relationship of each of these to experiential avoidance. • High levels of arousal may result in the depletion of emotional resources, thereby leading to emotional numbing.	• Results were based on self-report retrospective data which is vulnerable to demand effects • Tendency to engage in EA[2] may limit insight into extent of own emotional difficulties and responsivity. • No state measures of emotional responsivity which could tell us more about general emotional responsivity • Results are based on correlations, which limit ability to elucidate relationships between these factors

[1] PTSD; Post traumatic stress disorder

[2] EA; Experiential avoidance

Marx, B., P. & Sloan, D., M. (2005). Peritraumatic dissociation and experiential avoidance as predictors of posttraumatic stress symptomatology.	• Sample (size unknown) included those with histories of trauma and those without. • Mixture of clinical and non-clinical sample	• Childhood sexual abuse status, experiential avoidance, and emotional expressivity were significantly related to psychological distress. • Only experiential avoidance mediated the relationship between childhood sexual abuse status and distress.	• Evidence demonstrating experiential avoidance has the most influential role in the development of psychological symptoms. • Experiential avoidance and expressivity mediates the relationship between childhood sexual abuse status and psychological distress.	• Correlational analyses limit ability to identify causality inferences to be made.
Kashdan, T. B., Elhai, J. D., & Frueh, B. C. (2007). Anhedonia, emotional numbing, and symptom over-reporting in male veterans with PTSD	• Sample included archival dataset of 227 combat veteran outpatients. • Clinical interviews by trained interviewers were conducted with participants. • Cross sectional correlation analyses conducted • Clinical and non-clinical sample	• Veterans endorsing greater anhedonia had a greater likelihood of being classified as a symptom over-reporter (controlling for PTSD symptoms) • Anhedonia was the only symptom to adequately differentiate symptom over-reporters from non-over-reporting veterans.	• • Diminished positive emotions and their behavioural expression were uniquely associated with veterans' psychological experiences. • Heterogeneity of trauma reactions can be accounted for by exploring emotion regulation strategies, self-presentation, positive emotion, and positive emotion responsivity.	• Cross-sectional analyses limit causality conclusions • Anhedonia was measured using a sub-scale, not a stand-alone measure • Absence of positive emotion responsivity has been taken as a measure of anhedonia, rather than diminished positive emotion responsivity.

Price, J. L., Monson, C. M., Callahan, K., & Rodriguez, B. F. (2006). The role of emotional functioning in military-related PTSD and its treatment.	• Sample of veterans receiving treatment for military-related PTSD. Sample size unknown. • Clinical sample • Cross-sectional and across-treatment relationships among emotional functioning measures and PTSD symptoms.	• Overlap among emotion regulation, affective control, depressive and PTSD symptoms at pre-treatment. • Fear of losing affective control most strongly predicted changes in PTSD and depressive symptoms- a possible motivation to engage in experiential avoidance.	• Emotion regulation strategies are understood in the context of emotion regulation and affective control processes.	• Correlational analyses limit causal inferences to be made. • Underlying mechanisms of experiential avoidance linked to PTSD remain unknown.
Forbes, D., Fletcher, S., Lockwood, E., O'Donnell, M., Creamer, M., Bryant, R.A., McFarlane, A., Silove, D., (2011). Requiring both avoidance and emotional numbing in DSM-V PTSD: will it help?	• PTSD and depression examined in 835 traumatic injury survivors at 3 and 12 months post-injury. • Clinical sample • DSM-V[3] requirements using deliberate avoidance and emotional numbing were used.	• The DSM-V criteria resulted in significant reductions in PTSD caseness compared with at 3 and 12months post trauma. • By 12months, comorbid PTSD with depression rates were lower using the new criteria (due to lack of avoidance symptoms).	• Importance of including emotional numbing symptoms in addition to efforts to consciously avoid situations was demonstrated from these results.	• Clarifying diagnosis criteria does not broaden our understanding of what drives the emotional numbing symptoms.

[3] DSM-V; Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition

Kashdan, T. B., Morina, N., & Priebe, S. (2008). Post-traumatic stress disorder, social anxiety disorder, and depression in survivors of the Kosovo War: Experiential avoidance as a contributor to distress and quality of life.	• Sample included 174 Albanian civilian survivors of the Kosovo war. • Clinical interview conducted by masters students and self-report measures completed by participants • Mixed sample; clinical and non-clinical sample	• PTSD, Depression and Social anxiety disorder were associated with greater experiential avoidance and psychological distress, and reduced quality of life. • Experiential avoidance was a partial mediator of the effects of SAD[4] and PTSD on quality of life • Experiential avoidance identified as a mechanism partially accounting for association between PTSD and SAD with quality of life. •	• The study provided evidence for the importance of addressing PTSD, SAD, depression, and experiential avoidance in primarily civilian war survivors. • Experiential avoidance identified as a moderator and mediator of psychological well-being • Experiential avoidance may be a key mechanism in the pathological processes of PTSD and SAD.	• Homogeneity of the sample limits generalisability • Findings are reliant on clinical interview and self-report measures vulnerable to demand effects • Cross-sectional analyses reduce causality inferences to be made.
Frewen P. A, Dozois, D.J.A., & Lanius R. A. (2012). Assessment of anhedonia in psychological trauma: psychometric and neuroimaging perspectives	• Female sample included 55 with PTSD, and 35 without. • Mixed sample- clinical and non-clinical • A subset of this sample were used for the fMRI (n=15). Scans examined amygdala, orbitofrontal cortex, and the cerebellum. • Self-report measures were used for whole sample, and correlation analyses conducted	• Self-reported reduced positive affect AND increased negative affect in response to positive events • Identified additional emotional deficits as a result of anhedonia; interfering negative affect in response to positive stimuli	• Results identified symptoms of anhedonia in women with PTSD using standard measures, supporting previous research (Kashdan et al., 2006). • Identified potential sub-set of anhedonia in trauma; tendency to experience negative affective interference	• The study relied on retrospective, self-report measures as the method for assessing anhedonic responses to positive stimuli; vulnerable to demand effects and biases. • Correlations limit ability to clarify relationships and mechanisms between these factors. • Results are limited to females which limit their generalisability to males.

[4] SAD; Seasonal affective disorder

Frewen P. A., Dean J., Lanius R. A. (2012). Assessment of anhedonia in psychological trauma: Development of the Hedonic Deficit and Interference Scale.	• Sample of 99 undergraduate students (38 men and 61 women) • Mixed sample; clinical and non-clinical sample • Self-report measures were used for correlation analyses	• Histories of childhood emotional and sexual abuse were differentially associated with negative affective responses to positive events. • Reduced positive affect as well as increased negative affect found in response to normally positive affect eliciting stimuli	• Anhedonic symptoms identified as a function of self-reported trauma histories. • New scale developed and validated that measures anhedonic effects; the Hedonic deficit interference scale. • Different types of trauma may lead to variance in individual facets of negative emotion (e.g. shame vs anxiety).	• Homogenous sample of students. • A more robust measure of trauma screening (using interview rather than self-report measure) may be beneficial. • Correlational analyses limit extent to which underlying causal mechanisms can be identified.
Jerud, A. B., Zoellner, L. A., Pruitt, L. D., Feeny, N.C. (2014). Changes in emotion regulation in adults with and without a history of childhood abuse following posttraumatic stress disorder treatment..	• Adult sample of those with PTSD with or without a history of childhood sexual abuse (N=200). • Mixed sample; clinical and non-clinical • Study compared changes in emotion regulation and trait affect over the course of PTSD treatment with exposure therapy or sertraline	• Individuals with and without a history of childhood abuse did not differ at pre-treatment on PTSD severity, emotion regulation, or positive/negative affect. • Treatment was effective at improving emotion regulation and trait affect in all participants • No differences in emotion regulation or trait affect at 6-month follow-up	• Results demonstrate necessity of targeting emotion regulation deficits in PTSD. • Emotion regulation deficits are not specific to certain kinds of trauma • Emotion regulation and responsivity can be effectively treated when targeted in therapy	• Effectiveness of treatment is identified, but underlying mechanism targeted in treatment remains unknown. • Homogenous sample consisting of adult females- limits generalisability to males. • No waiting list control group, so improvements could be an artefact of recovery due to time.

	Roemer, L., Litz, B.T., Orsillo, S.M., & Wagner, A. W. (2001). A preliminary investigation of the role of strategic withholding of emotions in PTSD.	• 61 combat veterans including those with PTSD and those with no mental health diagnoses. • Mixed sample; clinical and non-clinical • Correlational methods used on self-report data using trait measures. •	• Veterans with PTSD reported significantly more frequent and intense withholding of their emotional responses compared to those without PTSD.	• Suppressing emotional responses was associated with PTSD, beyond measures of comorbid distress. • Experiential avoidance in the form of emotional suppression predicts the onset of PTSD.	• Correlational methods limit conclusions about causality. • Data relies on retrospective and self-report data vulnerable to demand effects.
Correlational studies with non-clinical samples	Maack, D.J., Tull, M. T., & Gratz, K.L. (2012). Experiential Avoidance Mediates the Association Between Behavioural Inhibition and Posttraumatic Stress Disorder.	• Sample included undergraduate students predominantly female (N=291) who had experienced at least 1 traumatic event. • Non-clinical sample including those with a history of trauma	• Behavioural inhibitory system (BIS) sensitivity and experiential avoidance were both strongly associated with probable PTSD status. • Relationship between BIS[5] sensitivity and probable PTSD status was explained by experiential avoidance.	• Individuals who report higher BIS sensitivity have a greater tendency to engage in experiential avoidance. • Includes physiological sensitivity link with experiential avoidance to broaden our understanding of this concept	• Correlational data limit conclusions about directions of associations. • Non-clinical homogenous sample limit generalisability and external validity of these findings to clinical populations.

[5] BIS; Behavioural inhibitory system

Kashdan, T.B., & Kane, J.Q. (2011). Posttraumatic distress and the presence of posttraumatic growth and meaning in life: Experiential avoidance as a moderator.	• 176 (136 women, 40 men) college students administered trait measures to those with a history of at least one traumatic event. • Mixed sample; non-clinical sample including those with a history of trauma • Correlational analyses • First study exploring relationship between post traumatic growth and experiential avoidance.	• Those reporting posttraumatic distress and less reliance on experiential avoidance reported greater posttraumatic growth and meaning in life compared with other trauma survivors. • High anxiety combined with inflexible use of experiential avoidance leads to attenuated psychological well-being.	• Greater distress appears to promote post-trauma adjustment when trauma survivors exhibit flexible responses to unwanted content. • Specific emotion regulation strategies used by trauma survivors play an important role in perceiving meaning and growth.	• Predominantly female sample limits generalisability to males. • Data from correlational analyses reduce causal conclusions. • Length of time since the traumatic event was not measured, which is likely to account for some of the variance identified.
Thompson, B., L. & Waltz, J. (2010). Mindfulness and experiential avoidance as predictors of post traumatic stress disorder avoidance symptom severity.	• 378 undergraduate students completed self-report psychological measures • Non-clinical sample	• Experiential avoidance symptoms (alexithymia, thought suppression and avoidant coping) were the most robust predictors of PTSD symptom severity.	• Mindfulness accounted for a unique proportion of variance in PTSD avoidance symptoms	• Homogenous sample limits generalisability of findings to clinical populations • Self-report data is vulnerable to demand effects • Correlational analyses limit conclusion to be made beyond association

Experimental studies with clinical samples	Shepherd, L., & Wild, J. (2014). Emotion regulation, physiological arousal and PTSD symptoms in trauma-exposed individuals.	• Sample included 45 trauma-exposed ambulance workers • Clinical sample • Negative emotions in real-time were examined using a computerised task to assess emotion regulation • Self-report measures and experimental methods were used to measure state emotion regulation and skin conductance.	• PTSD symptoms were associated with greater use of emotional suppression and less use of cognitive reappraisal strategies to down-regulate negative emotions during the task. • Increased PTSD symptom severity was associated with spending less time engaging in cognitive reappraisal and more time engaging in emotional suppression when required to decrease initial responses to unpleasant images	• Emotion regulation *ability* and PTSD symptoms rather than emotion regulation and PTSD identified as important • Difficulty regulating negative emotions may be a feature of trauma-exposed individuals with PTSD symptoms, linked to the emotional regulation strategies employed to manage negative affect. • Emotion regulation can be measured in real-time with a computerised task in trauma-exposed individuals	• PTSD was measured by self-report not by a clinician administered interview • Exploration of emotion regulation only includes negative affect, without considering positive affect changes. • No method of identifying the ‘ability’ of someone to regulate negative emotions. • Reliance on predominantly correlation analyses

Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hoffman, S. G. (2006) Effects of suppression and acceptance on emotional responses of individuals with anxiety and mood disorders.	• Sample included 60 adults presenting with anxiety and mood disorders. • Clinical sample • Participants randomly assigned to one group with instructions for suppressing emotions, and the other group for accepting emotions in response to an emotion-provoking film. • Subjective distress, heart rate, skin conductance, and respiratory sinus arrhythmia were measured before, during, and after the film.	• Both groups reported similar levels of subjective distress during the film. • The acceptance group demonstrated less negative affect during the post-film recovery period. • The suppression group demonstrated increased heart rate and the acceptance group decreased heart rate in response to the film. • Suppression group manifested poorer recovery from changes in negative affect compared to the acceptance group.	• Emotion regulation strategies aimed at suppressing negative emotions are physiologically effortful. • Studies of emotion regulation in a clinical sample in lab settings allowed for experimental manipulation of experiential avoidance. • The concept of emotional suppression was broadened to include the down-regulation of both externally expressed and internally felt affect and contrasted this to acceptance.	• Findings limited to anxiety related pathology, and limit generalisability to trauma. • There was no control group following no emotion regulation instructions, which limit the extent to which findings can be attributed to the emotion regulation strategies manipulated in the study.
Kashdan, T. B., Breen, W. E., & Julian, T. (2010). Everyday strivings in combat veterans with posttraumatic stress disorder:	• Sample of veterans with PTSD and those without asked to identify their strivings on a daily basis. Sample size unknown. • Mixed sample; clinical and non-clinical sample. • Personality and emotional functioning measures completed by participants.	• Those with PTSD with a high rate of emotion regulation strivings led to the lowest global well-being and daily self-esteem during a 14-day assessment period. • PTSD and avoidance strivings led to reduced psychological well-being.	• Veterans that devoted finite time and energy to regulating emotions was associated with less purpose, meaning, and joy compared with other strivings.	• Correlational analyses reduce causal conclusions to be identified. • Reliance on self-reports vulnerable to demand effects and biases.

Experimental studies with non-clinical samples	Dunn, B.D., Billotti, D., Murphy, V., & Dalgleish, T. (2009). The consequences of effortful emotion regulation when processing distressing material: A comparison of suppression and acceptance	• 89 adults (49 female) using non-clinical UK sample • Trauma film paradigm used • Electrodermal activity (EDA)[6] and HR[7] measured • Trait and state measures of emotional responsivity used • 3 experimental groups divided between suppression, acceptance and controls	Suppression group: • Reduced emotional responsiveness to negative and positive stimuli. • Impaired recall of video content compared to acceptance group • More variable HR Acceptance group: • Reduced EDA and increased HR following trauma exposure • Increased negative affect in one week follow up compared to suppression group	• Suppressing emotions can down-regulate emotion (positive and negative) and memory. • Acceptance may elevate subsequent emotionality (negative and positive affect). • Emotional suppression strategies may actually be effective in certain situations, but can also have a potential rebound effect and reduce positive affect, detrimental to psychological well-being	• Generic, non-personally salient positive stimuli was used, limiting findings to generic stimuli only • Use of a poor quality video clip during the trauma analogue • Non-clinical use of emotional suppression used, which limits extrapolation to clinical samples
	Kashdan, T.B., Barrios, V., Forsyth, J.P., & Steger, M. F. (2006) Experiential avoidance as a generalized psychological vulnerability: Comparisons with coping and emotion regulation strategies	• 382 undergraduate students in study 1 for correlation analyses of self-report trait measures. • 92 undergraduates in study 2 for 21 day experience sampling. • Correlational analyses conducted on experience sampling and behavioural event reporting	• Experiential avoidance was a stronger predictor of daily anxiety-related pathology and emotional distress compared to other emotion regulation strategies. • Experiential avoidance was found to be integral in predicting day-to-day distress and hedonic functioning.	• Individuals reporting greater experiential avoidance suffer from affective, cognitive, and social consequences associated with psychological distress and diminished hedonic functioning. • Some of the first empirical evidence to support experiential avoidance, specific to anxiety related distress.	• No experimental manipulation of variables limits correlational findings • Self-report data is vulnerable to demand effects and biases • Non-clinical population limits generalisability to clinical samples

[6] EDA; Electrodermal activity

[7] HR; Heart rate

The studies reviewed including those in Table 1 aim to answer the following questions;

- How do current models account for emotional numbing symptoms in PTSD?
- What is known about possible mechanisms underlying emotional numbing in PTSD?
- What role does experiential avoidance play in emotional numbing in PTSD?
- What remains unknown about experiential avoidance and PTSD?

These questions will be addressed systematically, to identify our current understanding, and explore the role of EA in emotional responsivity, (specifically emotional numbing) in PTSD.

How do current models account for emotional numbing symptoms in PTSD?

To establish our understanding of emotional responsivity deficits in PTSD, it is necessary to explore how models of PTSD currently account for emotional numbing. Several models of PTSD attempt to explain PTSD symptomology. The stress response model (Horowitz, Wilner, & Kaltreider, 1980) describes PTSD symptoms as the result of images, and memories of the trauma do not get incorporated into the individual's mental representations of themselves, others and the world (Horowitz et al,. 1980). Incomplete assimilation of new-trauma related

information into existing mental representations may result in psychological defence mechanisms, in the form of emotion regulation strategies to numb negative emotions. However, strategies to numb negative emotions can interrupt encoding of memories which remain stored in active memory, resulting in re-experiencing symptoms (Horowitz et al., 1980). This model emphasises the role of appropriate encoding at a cognitive level, but does not address how affective experiences are to be encoded, and how this process if interrupted underlie the aetiology and maintenance of PTSD.

The Associative Network Theory (Foa, Steketee & Rothbaum, 1989), emphasises that trauma must be assimilated in an associative network (including the cognitive, behavioural and physiological reactions to trauma) in the long-term memory store. This network can be re-activated when the individual comes across reminders of the event, resulting in re-experiencing cognitive, behavioural and physiological symptoms. Due to the distressing nature of this re-activation, individuals are likely to attempt to suppress and numb negative emotions, to prevent distress. Although this model recognises motivation to regulate emotions in response to trauma, it does not explain the underlying mechanisms of an emotion suppression strategy.

The Cognitive Model (Ehlers & Clark, 2000) places greater emphasis on the role of thought processes and emotional appraisal in the development of PTSD which underpins cognitive behavioural therapy (CBT) for PTSD (National institute of clinical excellence; NICE, 2006). Negative appraisal of an event, combined with the disturbance of a clear, autobiographical memory trace contribute to the individual

developing an intense sense of threat and fear, triggered by the environment. The researchers propose emotion regulation strategies that attempt to avoid and numb these emotions (e.g. intense fear) perpetuate this perceived threat, and maintain re-experiencing and emotional numbing symptoms (Ehlers & Clark, 2000). Therefore, this model begins to explain why emotional suppression may maintain emotional numbing symptoms, but is unable to identify these process mechanisms (Dalgleish, 2004).

Summary and critique of PTSD models. The cognitive focus of these models emphasizes the accurate assimilation of the memory trace into the long-term memory store to prevent PTSD onset. For successful assimilation of traumatic events the individual must be willing to address private negative affective experiences (i.e. emotions, memories, images, and physiological reactions). Therefore, the individual may engage in an emotional suppression strategy to numb distressing affective experiences. Efforts to avoid and control contact with these experiences known as experiential avoidance interfere with this processing (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). The Cognitive model (Ehlers & Clark, 2000) provides a more comprehensive account for this process compared to other models. However, across all models, emotion regulation is not accounted for to the same extent as cognition, thus emotional numbing remains poorly accounted for in current PTSD models.

What do we know about emotional numbing in PTSD?

Emotional numbing is distressing due to reduced pleasure and wellbeing (Frewen, Dean & Lanius, 2012), associated with poor emotional adjustment (Hassija, Jakupcak & Gray, 2012, Kashdan, et al., 2006, Marx & Sloan, 2004) and predicts poorer treatment outcomes (Asmundson et al., 2004). Furthermore, emotional numbing resulting in anhedonia; deficits in the ability to experience positive affect predicts the onset of PTSD symptomatology following trauma (Kashdan et al., 2006, Kashdan, Morina, & Priebe, 2010, Kashdan, Elhai & Frueh, 2007, Roemer, Brett, Litz, Orsillo, & Wagner, 2001), predicts psychiatric co-morbidity (Frewen et al., 2012, Kashdan & Breen & Julian 2010, Kashdan et al., 2010) and is increasingly recognised as a consequence of trauma exposure (Frewen et al., 2012).

Neuroimaging studies reveal a dissociative sub-type of PTSD characterised by symptoms of chronic emotional numbing (Frewen, David, Dozois, & Lanius, 2012, Lanius et al., 2010). Further research found emotional numbing predicted reduced positive affect in response to positive-valence scripts, with associated reduced responsivity within the ventromedial prefrontal cortex (Frewen, Dozois, Neufeld, Lane, Densmore, Stevens & Lanius, 2012). These findings support the neural and clinical correlates of emotional numbing in PTSD. However, since these findings are correlations only, it remains unclear whether the mechanism through which emotional numbing is associated with PTSD vulnerability is as a result of specific emotion regulation strategies individuals adopt that leads to anhedonia in PTSD.

What are the possible mechanisms of emotional numbing in PTSD?

In current PTSD models, avoidance is described as a key processes preventing adaptive processing of the traumatic event (Ehlers & Clark, 2000). Of the three core symptom clusters associated with PTSD (re-experiencing, avoidance and hyperarousal), evidence suggests Cluster C avoidance symptoms (including efforts to avoid trauma related experiences, difficulty recalling trauma, diminished interest in activity, emotional detachment, and reduced positive affect (APA, 2000) are the strongest indicators of a PTSD diagnosis (Nemeroff et al., 2006), and the most predictive of symptom severity (Marx & Sloan, 2004). These avoidance patterns have been given the umbrella term of experiential avoidance (EA), is defined as an effortful process to control and numb emotional responses to, or escape negative experiences and emotional distress when encountering distressing material (Hayes, 1994).

Experiential avoidance. EA is a broad category of emotional regulation to blunt negative experiences and includes a) the unwillingness to remain in contact with aversive private experience (bodily sensations, thoughts, feelings, emotions, memories etc) and b) action taken to avoid, alter, or control contact or exposure to stimuli that may trigger these reactions (Hayes et al, 1999). However, attempts to change negative experiences, by engaging in EA as an emotion regulation strategy can reduce an individual's flexibility in dealing with unpleasant situations, which can be detrimental to their quality of life (Kashdan et al., 2006). Therefore, an inflexible reliance on EA can exacerbate and maintain PTSD symptomology (Tull, Gratz, Salters & Roemer, 2004), by reducing their capacity to process trauma. Although

avoiding stimuli, emotions or reminders connected to the traumatic event may be adaptive initially the inflexible nature of avoidance can result in changes to non-trauma related stimuli. Consistent with this, research exploring the intentions of trauma exposed veterans who reported the long-term use of EA to manage PTSD symptoms found fear of losing affective control most strongly predicted an increase in PTSD and depressive symptoms (Price, Monson, Callahan, & Rodriguez, 2006).

Consequently, emotional numbing in PTSD may be the outcome of EA used as an avoidance strategy to numb difficult emotional experiences. The blunt nature of this strategy may cause a knock-on effect of anhedonia, thereby maintaining PTSD symptomology (Thompson & Waltz, 2010). Supporting evidence found EA identified following a traumatic event was an even bigger predictor of subsequent psychological distress, compared to the trauma severity, general psychopathology, or prior trauma functioning (Plumb, Orsillo, & Luterek, 2004). These findings suggest using EA as an avoidant coping strategy following trauma could perpetuate PTSD symptoms due to the physiological and psychological effort required (Maack, Tull & Gratz, 2012) which impedes the emotional and cognitive processing needed to contextualise trauma related information (Ehlers & Clark, 2000).

Following this notion, it is worth considering however, whether it is possible to differentiate EA as an emotion regulation strategy that is clearly distinct from the set of avoidance symptoms in PTSD. For instance, EA as an emotion regulation strategy encompasses cognitive, emotional and behavioural avoidance strategies, and as such may overlap with the avoidance symptoms in PTSD (i.e. persistent

avoidance of stimuli associated with the trauma and numbing of general responsiveness). To differentiate the two, it is necessary to consider the onset and continued use of the emotion regulation strategy, whereby EA may serve a very adaptive function to initially cope with the trauma by specifically aiming to reduce negative affect as a result of the trauma (Tull & Roemer, 2003). However, when EA is inflexibly and rigidly applied as a method to continually regulate emotions, it can be maladaptive due to the subsequent knock on effect of emotional numbing, i.e. anhedonia- identified as part of the avoidance symptoms in PTSD (Boeschen, Koss, Figueredo & Coan, 2001). EA can then become the emotion regulation strategy that maintains the avoidance and anhedonic symptoms in PTSD, which may account for the high rates of EA found in those with PTSD (Boeschen et al., 2001). The challenge to differentiate EA as an emotion regulation strategy from the avoidance symptoms themselves necessitates further research to attempt to elucidate the complex interplay of how EA contributes to avoidance and anhedonia in PTSD. Although these studies presented so far have used clinical samples which enhance their ecological validity, the correlational findings limit the extent to which causal inferences about how EA contributes to anhedonia in PTSD can be made. Therefore, without experimental manipulation of emotional coping styles, it is premature to conclude that an avoidant coping style causes PTSD; much less that it causes anhedonia.

In light of these drawbacks, recent evidence examined EA in trauma exposed ambulance workers instructed to decrease their responses to unpleasant images

using a laboratory controlled computer task (Shepherd & Wild, 2014). The researchers found increased PTSD symptom severity associated with reduced cognitive reappraisal and increased use of EA in the form of emotional suppression. Despite this evidence further supporting EA in PTSD aetiology, our understanding of the actual mechanisms underlying the relationship between EA and emotional responsivity deficits in PTSD are limited (Litz, Schlenger, Weathers, Caddell, Fairbank & LaVange, 1997). Recognition of this limited understanding has led to a growing interest in research investigating our understanding of how features of EA (e.g. emotional suppression) contribute to emotional numbing in PTSD (Thompson & Waltz, 2010).

What role does experiential avoidance play in emotional numbing?

One of the first studies to examine specific mechanisms investigated the effects of emotional suppression in participants with and without diagnosable mood and anxiety disorders (Campbell-Sills, Barlow, Brown & Hofmann, 2006). The researchers included two groups asked to either emotionally suppress or to actively accept their emotions when watching distressing material. The suppression group manifested poorer recovery from changes in negative affect compared to the acceptance group. Although the lack of PTSD in this study limits the extent to which the findings inform the aims of the current review the study provides the first experimental manipulation of emotional suppression, allowing causal inferences to be made about suppression on subsequent emotional responsivity. However, there was no control group following no emotion regulation instructions so poorer

recovery from changes to negative affect cannot be confidently attributed to the emotional suppression induced.

Kashdan et al., (2006) used a correlational design and a 21 day experience sampling method to explore undergraduates' self-report responses on psychological measures, with the use of EA as a coping mechanism and subsequent affective experiences. Individuals reporting greater EA suffered from more psychological distress, reduced positive psychological functioning and diminished daily positive affective experience (Kashdan et al., 2006). A key limitation is EA explored in the context of anxiety related distress, not trauma. Also, reliance on self-report measures may be vulnerable to demand effects, and reduce generalisability to clinical populations. Similar research later explored the effects of continued striving to control emotions using EA amongst a veteran sample (Kashdan et al., 2010). The researchers found veterans that reported devoting time and energy to controlling negative emotions were associated with less purpose, meaning, and happiness. Both studies reflect some of the first empirical evidence supporting EA as impacting upon diminished positive affect. Furthermore, both studies rely on correlational methods which limit conclusions since the designs cannot allow causation to be concluded.

Further evidence for the effects of EA in response to trauma comes from Roemer, Brett, Litz, Orsillo, and Wagner, (2001). In this study, all participants had been exposed to warzone trauma and included veterans with PTSD, who were compared to veterans without (Roemer et al., 2001). The extent of participants' intensity and

frequency of emotional suppression was assessed, and the degree to which they were more likely to suppress positive, negative, or both positive and negative emotions equally (Roemer et al., 2001) via self-report responses. Veterans with PTSD indicated more frequent and more intense emotional suppression relative to veterans without PTSD, and were more likely to report inhibition of both positive and negative emotions, compared to veterans without PTSD (Roemer et al., 2001).

The researchers conducted similar research with survivors of childhood sexual abuse, and included hyperarousal symptoms when examining how EA is associated with emotional numbing (Tull & Roemer, 2003). EA explained a significant percentage of the variance in emotional numbing symptoms above and beyond intrusions for those with PTSD (Tull & Roemer, 2003). However, hyperarousal symptoms were found to be a more significant predictor of emotional numbing symptoms and all other symptoms of PTSD. These results suggest that hyperarousal in PTSD may deplete emotional resources, an outcome of which is reduced ability to experience positive affect.

Methodological limitations necessitate findings to be interpreted carefully. Both studies relied on self-report data which can be vulnerable to demand effects, and correlation findings do not imply causality, which limit our ability to ascertain specific mechanisms. Therefore, it is possible that clearer associations between EA and numbing would have been shown if laboratory measures of positive emotional reactivity were used in preference to relying on self-report measures.

In light of these methodological limitations from correlational designs, Dunn, Billotti, Murphy and Dalgleish (2009) examined state emotional responsiveness under laboratory conditions and examined subjective, physiological, and behavioural aspects of emotion suppression in a non-clinical sample. Half of participants were instructed to actively suppress their emotions whilst viewing a traumatic video (Steil, 1996) and controls were not instructed. The suppression group had more variable heart rate responses, and impaired video memory recall (Dunn et al., 2009), suggesting suppressing emotions was cognitively and physiologically demanding. Inconsistent with previous findings (Kashdan et al., 2006, Gross, 1998) Dunn et al. (2009) found the suppression group reported no negative impact on their mood, but did show reduced self-report positive affect in response to positive imagery stimuli.

Methodological limitations necessitate caution when interpreting findings. Firstly, although reduced positive affect was identified, this was in response to generic positive stimuli, which restricts conclusions to generic positive stimuli only, not personally relevant and salient stimuli. Secondly, although the trauma film paradigm (Holmes & Bourne, 2008) allows for experimental manipulation of emotional suppression, there is a trade off with reduced ecological validity. Specifically, the form of EA induced in participants from the emotion suppression instructions was based on a non-clinical form of emotional suppression based on previous research (Campbell-Sills et al., 2006) which limits generalisability to clinical populations.

Summary and critique of experiential avoidance and emotional numbing research in PTSD. Although research has demonstrated relationships between EA and the development, and maintenance of emotion deficits in PTSD, the underlying mechanisms of these relationships remain less understood. Also, often researchers rely on self-report measures, which are vulnerable to demand effects, and may echo deficits in insight about their affective experiences of those who use EA. Furthermore, the majority of these findings discussed in this review are from correlations, making it difficult to delineate whether EA as a form of emotion regulation causes reduced affective experience in PTSD, or if the presence of EA is as a result of PTSD symptoms, i.e. hyper-arousal (Tull & Roemer, 2003).

Therefore, whilst further conclusions can be drawn from the studies that use experimental methods with less reliance on self-reports and correlation designs, additional research must be conducted to replicate the findings, in order to confidently contribute to our understanding of EA and anhedonia in PTSD. Furthermore, forms of EA identified in the literature typically include participants using non-clinical forms of emotional suppression which poses a challenge generalizing findings to clinical presentations. Therefore, inducing a more clinically relevant form of EA would provide findings more easily extrapolated to a clinical population.

What remains unknown about experiential avoidance and PTSD?

Clinical forms of experiential avoidance. An example of a more clinically relevant, inflexible form of EA comes from the schema therapy paradigm (Young, 2005). A schema mode refers to adaptive, or maladaptive modes of operating that are currently active for the individual, that is an organised pattern of thoughts, feelings and behaviours based on a set of schemas, independent from others (Arntz, Klokman, & Sieswerda, 2005). An example of clinical EA can be found in the detached protector mode (DP) which reflects a state of EA involving active, unconscious and automatic efforts to keep emotions at distance, resulting in emotional numbing (Rafaeli, Bernstein, & Young, 2011). The DP mode therefore is a form of inflexible EA in the form of emotional suppression characterised by withdrawal, disassociation, detachment from others, and an unwillingness to experience negative responses (Arntz et al., 2005), used as a maladaptive coping strategy (Young, Klosko & Weishaar, 2003).

The DP mode develops due to the individual blocking out their emotional needs, to meet the expectations of others to avoid punishment or negative emotions, by keeping an emotional distance from others to protect from potential psychological distress (Young, 2005). Features of individuals being in this DP mode include depersonalisation, emptiness, boredom, psycho-somatic complaints, blankness, and compliance with others (Young, 2005). The DP mode represents a state of psychological withdrawal, to avoid emotions and people (Nysaeter & Nordahl, 2008), where the individual may be pushed into a dysphoric state (Nysaeter &

Nordahl 2008). Outcomes of this for the individual include feeling low with flat affect, emotional numbing and experiencing anhedonia.

The impact on emotional experiences as a result of using the DP mode has not been examined in depth experimentally, due to the challenges in being able to operationalize a more clinically relevant form of EA. Research that has used the DP mode amongst individuals with borderline personality disorder relied on participants being exposed to an emotive video to trigger them flipping into the DP mode (Arntz et al., 2005). Therefore, future research could use experimental conditions to more explicitly examine the DP mode as a clinically relevant example of EA.

Revisiting review aims; what remains unanswered? The review of articles presented here to answer the original five aims highlight several gaps in the extant literature. Current models account for cognitive regulation more than emotion regulation, however Ehlers and Clark (2000) provide the most comprehensive model so far, emphasising the importance of appropriate emotional processing following trauma exposure. Regarding the second and third question, relatively little is known about mechanisms underlying emotional numbing in PTSD, but a large body of research supports the role of EA as predicting PTSD onset, yet less is known about whether EA is responsible for anhedonia in PTSD. Recent years have seen an increase in clinical and non-clinical samples being investigated using correlational and more experimental methods to elucidate the role of EA on subsequent emotional responsivity. Whilst valuable findings have demonstrated the detrimental effects of EA on reduced positive affect, methodological limitations of

research reviewed here necessitate gaps in the evidence base to be addressed by future research.

Future research

Consequently, there exists a dearth of research using experimental methods to manipulate and better operationalize EA as a form of emotion regulation in a trauma context. Based on findings that have highlighted the relationship between EA and reduced positive affect, research can no longer justify focusing predominantly on negative affect experience. Therefore, since a large body of research points towards EA as a possible mechanism, experimental methods using a clinically relevant form of EA would contribute to elucidating what drives anhedonia in PTSD.

Furthermore, with the majority of research having focused on exploring causes of PTSD symptoms, relatively little was known about protective factors as indicators of psychological resilience to trauma and not developing PTSD (Bonanno & Mancini, 2012). Evidence has shown that whilst PTSD avoidance symptoms were positively correlated with EA, they were also negatively correlated with mindfulness, suggesting that the mindfulness approach was linked to greater psychological functioning following trauma (Thompson & Waltz, 2010). Acceptance of experiences was also found to be more negatively associated with PTSD, compared to EA (Thompson & Waltz, 2010). Although a relationship has been identified, less research has explored how mechanisms of mindfulness can ameliorate PTSD symptoms. Future research exploring this notion can contribute to

our understanding of PTSD to account for the heterogeneity of risk protective factors associated with PTSD onset.

Conclusion

From the discussion presented here around emotional regulation in PTSD, and factors underlying reduced emotional responsivity in PTSD, it is clear there is a growing body of literature demonstrating that inflexible reliance on EA can put individuals at risk of experiencing psychological distress, developing PTSD and experiencing continued anhedonia following trauma (Kashdan et al., 2006). Although methodological limitations need to be considered when interpreting findings, evidence suggests that EA plays a fundamental role in the development of emotional numbing, i.e. anhedonia symptoms in PTSD. However, the underlying causal mechanisms of EA leading to emotional numbing remain unknown and poorly accounted for in current models and treatments for PTSD.

The importance of further understanding mechanisms of EA cannot be underestimated since evidence has shown that it is not the degree of emotional distress resulting from the trauma, but the inflexible or flexible use of EA following trauma that determines post-trauma adjustment (Kashdan & Kane, 2011). Consequently, researchers have a responsibility to conduct further investigation to identify what mechanism of EA drives diminished positive affect, to provide further insight into the underlying nature of and recovery from PTSD to improve treatments (Forbes et al., 2011).

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Appendices

Appendix A: Copy of instructions for authors for the target journal Behaviour research and therapy.

Doctorate in Clinical Psychology

Part 2: Empirical paper

Does engaging in experiential avoidance cause emotional numbing in post traumatic stress disorder?

Total Word Count: 7997 (excluding titles, tables,figures, and references).

Supervisors: Dr. Barnaby Dunn and Dr. Anke Karl, Exeter University.

Target journal: Behaviour research and therapy (BRAT) journal.

Signature: ……..

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Abstract

Experiential avoidance (EA), or the evasion of unpleasant internal experiences, is key to changes in emotional responsivity in Posttraumatic Stress Disorder (PTSD). EA has been linked to altered negative emotional reactivity in PTSD, but it remains unclear whether EA is linked to altered positive reactivity in PTSD, i.e. anhedonia. Therefore the study examined how manipulating EA influences emotional responsiveness in a non-clinical adult population (*N*=74). Positive emotion reactivity (self-report and psychophysiology) was measured before and after viewing a laboratory analogue trauma induction, with half of participants instructed to adopt the detached protector (DP) mode as an example of EA during trauma viewing and half of participants in an uninstructed control condition.

Following the DP mode instructions reduced negative emotion experience during the trauma induction, relative to the control condition. However counter to prediction, there was no carry over onto blunted positive emotion experience or psychophysiological response in the experimental condition (relative to the control condition) when recalling positive memories and imagining positive future events. No significant relationships were identified between trait EA levels and anhedonia symptoms or pre-manipulation positive emotional responsiveness in the laboratory. Overall, the current findings offer no support for the hypothesis that EA contributes to anhedonia.

Highlights

- To date possible mechanisms driving anhedonia in PTSD are poorly understood
- Experiential avoidance and emotional responsivity was manipulated using the trauma film paradigm
- The study induced the detached protector mode when viewing a trauma video
- Objective and subjective measures of emotional responsivity were investigated
- Current findings found no support for experiential avoidance causing anhedonia in PTSD.

Introduction

PTSD is a trauma and stress-related disorder resulting from a dangerous, life changing event characterised by distressing symptoms including re-experiencing (i.e. intrusive images, thoughts, flashbacks, and nightmares), avoidance and hyperarousal (American Psychiatric Association; APA, 2000). Emotional difficulties include irritability, anger, distress, and emotional numbing, which refers to a collection of PTSD symptoms including anhedonia, defined as the diminished interest in previously enjoyed activities, diminished positive affect and restricted emotional expression; Kring & Wernet, 2004). Research exploring these emotional difficulties in PTSD to date has typically focused on heightened negative affective experience. However, the evidence base has by comparison neglected to explore emotional numbing symptoms as a loss of general emotion experience, and more specifically anhedonia, referring to altered positive affective experience related to emotional numbing. These set of symptoms are disabling and distressing, and despite having been identified as predictors for impaired responses to treatment (Asmundson, Stapleton & Taylor, 2004), these emotional numbing symptoms have been theoretically and clinically neglected. It is increasingly argued that building positive affect can bolster resilience, social networks, and serve as key motivators to overcome difficult life experiences (Kashdan et al., 2007). Therefore, further investigation of what drives diminished positive affect may provide further insight into the underlying nature of, and recovery from PTSD (Kashdan et al., 2007).

Emotional numbing in PTSD

Numbing is inherently unpleasant, reducing pleasure and wellbeing (Frewen, Dean & Lanius, 2012), poor adjustment in a sample of veterans (Hassija, Jakupcak & Gray, 2012) and predicts poorer treatment outcomes (Asmundson, et al., 2004). Moreover, anhedonia predicts the onset of PTSD symptomatology following exposure trauma (Kashdan, Barrios, Forsyth, & Steger, 2006) and also predicts psychiatric co-morbidity (Frewen et al., 2012). Neuroimaging studies reveal that a dissociative sub-type of PTSD is characterised by symptoms of chronic emotional numbing (Frewen, et al., 2012). However, it remains unclear whether EA as a form of emotion regulation strategy provides the mechanism associated with vulnerability to developing PTSD, that leads to emotional numbing symptoms and specifically anhedonia in PTSD. Thus, the underlying psychological mechanisms that drives numbing in PTSD are currently poorly understood (Tull & Roemer, 2003), and are therefore the focus of the current study.

Mechanisms of emotional numbing

One possible mechanism underpinning emotional numbing may be experiential avoidance (EA): the effortful process to control, escape or avoid aversive private experiences (e.g. physical sensations, thoughts, emotions and memories) due to an unwillingness to remain in contact with these experiences (Hayes, 1994). A range of avoidant behaviours/responses have been associated with PTSD symptoms, including the strategic withholding of emotions (Roemer, Brett, Litz, Orsillo, and Wagner, 2001) and the suppression of negative material (Valentiner,

Foa, Riggs & Gershuny, 1996). Avoidance in PTSD has also been identified as one of the strongest predictors for emotional numbing amongst a large sample of college students (Flack, Milanak, & Kimble, 2005). EA has typically been seen as a strategy to reduce unwanted negative emotion experience, and there is increasing interest in the idea that extensive, inflexible use of EA may inadvertently blunt positive emotion experience. This can be referred to as the 'unintentional spillover hypothesis'**.** There is correlational evidence consistent with this hypothesis, but at present this is inconclusive (Kashdan et al., 2006).

First, EA was found to explain a significant percentage of the variance in emotional numbing symptoms above and beyond intrusion symptoms for those with PTSD (Tull & Roemer, 2003). However, EA did not remain a significant predictor once hyperarousal was included in the model. It is possible that clearer associations between EA and numbing would have been shown if using laboratory measures of positive emotional reactivity rather than relying on symptom self-report measures. Second, Kashdan et al., (2006) used a 21 day experience sampling method and found EA was linked to reduced positive psychological functioning and diminished daily positive affective experience.

Furthermore, neurobiological research found emotional numbing symptoms predicted less positive affect in response to positive-valence scripts, with reduced responses within the ventromedial prefrontal cortex (Frewen, Dozois, Neufeld, Lane, Densmore, Stevens & Lanius, 2012). A key limitation of these studies is the

reliance on correlational methods, which limits conclusions to be made since the designs do not imply causation. Therefore, in order to make more causative conclusions, EA should be manipulated using experimental methods.

Laboratory designs for investigating EA mechanisms.

In recognition of the challenges investigating causal mechanisms of EA, experimenters have used the analogue trauma film paradigm offering laboratory control investigating analogue cognitive mechanisms during initial trauma processing (Holmes & Bourne, 2008). The paradigm can induce analogue PTSD-like symptoms (e.g. fear, avoidance, and arousal), indicating the paradigm provides a useful analogue for real life trauma, contributing to more ethically demanding and ecologically valid research with PTSD participants (Holmes & Bourne, 2008).

Using the trauma film paradigm, Dunn, Billotti, Murphy & Dalgleish (2009) examined state emotional responsiveness by investigating subjective, physiological, and behavioural aspects of emotion suppression. Participants were instructed to actively suppress their internal and external emotions whilst viewing traumatic material. The suppression group had more variable heart rate responses, and impaired memory recall (Dunn et al., 2009), suggesting actively suppressing emotions was cognitively and physiologically effortful. Inconsistent with previous findings (Kashdan et al., 2006, Gross, 1998), Dunn et al., (2009) found the suppression group reported no negative effect on their mood or responses to emotive material, but did demonstrate reduced self-report positive affect in response to positive imagery stimuli. This finding is consistent with the unintentional

spillover hypothesis, whereby emotional suppression may inadvertently blunt positive and negative affective experiences.

Methodological limitations necessitate further research to address these drawbacks. Firstly, although reduced positive reactivity was recorded towards the positive stimuli, these were generic positive stimuli which were not personally relevant to the individual. This restricts conclusions to generic positive stimuli only, not personally salient stimuli. To enhance the generalizability of findings to individual positive affective experiences, future research should aim to examine emotional responsiveness using personally salient and meaningful positive stimuli. Secondly, research including Dunn et al., (2009) using the trauma film paradigm have predominantly used the video clip by Steil (1996) due to its extensive use as an analogue trauma induction (Holmes & Bourne, 2008). The clip (video recording of the aftermath of real life road traffic accidents) has poor resolution and sound, and data using the paradigm may be detrimentally affected by the poor quality of video clip. Therefore, the paradigm would benefit from a more modern and higher quality video clip as a trauma induction. Thirdly, the form of EA induced in participants was based on a non-clinical form of emotional suppression which poses a challenge generalizing findings to clinical presentations. Therefore, inducing a form of more clinical EA would provide findings more easily extrapolated to a clinical population.

An example of a more clinically relevant, inflexible form of EA comes from the Schema Therapy paradigm, where individuals may rigidly adopt the detached protector mode (DP) as an example of chronic emotional suppression characterised by withdrawal, disassociation, detachment from others, and an unwillingness to experience negative responses (Arntz, Klokman, Sieswerda, 2005) used as a maladaptive coping strategy (Young, Klosko & Weishaar, 2003). The DP mode is linked to negative emotion reactivity (Arntz et al., 2005) but it remains unknown whether the DP mode also contributes to reduced positive emotion reactivity. Since a core feature of PTSD is avoidance of experiences related to past trauma (APA, 2000), EA may underlie avoidance strategies to cope with unpleasant emotions (Arntz et al., 2005). Consequently, it would be valuable to investigate emotional numbing using the DP mode as a clinically relevant example of EA, capturing features of an inflexible example of emotional suppression in clinical settings.

Research Questions

Existing research exploring EA and emotional numbing has been explored in a range of mood disorders however in PTSD it remains somewhat neglected in the evidence base. Given that trauma survivors frequently report experiencing emotional numbing in response to situations which would have previously elicited positive affect (APA, 2000), recent years have seen an increase in studies exploring emotional numbing in PTSD. In particular, the trauma film paradigm has been effectively used to examine features of PTSD using an experimental design

(Holmes & Bourne, 2008). Therefore, the current study aimed to explore EA as a causal mechanism underlying emotional numbing specifically identified in PTSD, whilst addressing recognised limitations of the existing PTSD literature using a trauma analogue design.

Therefore, participants recalled positive memories and imagined future positive events before and after viewing the trauma induction, with participants instructed to adopt an inflexible form of state EA (following the DP mode instructions) or no strategy (following instructions to act normally) during the video. Participants had two psychophysiological indices recorded; heart rate (HR) and galvanic skin response (GSR) to provide two objective measures of emotional response throughout the experiment, which are less susceptible to demand effects, and thus assist in triangulating information in conjunction with more subjective responses from participants as measures of emotional responsivity. In particular, GSR has been used extensively in the evidence base as indexing emotional arousal (Weiton & McCann, 2007), and HR as an index of emotional valence (Fujimura & Okanoya, 2012) both of which have been used extensively in the literature around emotion regulation and in response to distressing material (Holmes & Bourne, 2008)

Two tasks were administered to participants to elicit positive affect, including both an autobiographical memory and future imagination tasks. Research has shown that emotional numbing in PTSD affects the ability to recall positive experiences (McNally, Lasko, Macklin & Pitman, 1995.) and to imagine positive events, which have been identified as sharing an underlying causal mechanism which remains

unknown (Brown et al., 2013). Therefore, in order to increase the likelihood of capturing changes in affective experience (as predicted by the current hypotheses) two separate measures (autobiographical and imagined positive events) reflecting separately identified deficits in these areas were used in this study Additional trait measures of avoidant coping strategies allowed for associations with positive emotional responsiveness to be explored answering the following research questions;

- Does adopting the DP mode as a form of state EA when exposed to distressing material, blunt subsequent positive emotional responsiveness?
- Is greater trait use of DP and other avoidant coping strategies associated with reduced positive emotional responsiveness?

Hypotheses

Based on the unintentional spill-over account it is predicted that:

1. Participants asked to follow detached protector instructions will demonstrate reduced subjective reactivity but an increase in psychophysiological responses compared to controls when viewing the trauma video, due to the physiological effort of suppressing emotions in response to distressing material (Dunn et al., 2006, Gross, 1998.)
2. Participants in the induced detached protector group will demonstrate reduced levels of negative self-reported affect during the memory and imagine tasks compared to controls.

3. Participants in the induced detached protector group will demonstrate reduced levels of positive self-reported affect during the memory and imagine tasks compared to controls.
4. Participants in the induced detached protector group will demonstrate increased levels of psycho-physiological response during the memory and imagine tasks compared to controls.
5. Higher scores on the psychological measures pertaining to experiential avoidance and emotional suppression will be associated with reduced levels of positive affect experienced in laboratory conditions and questionnaire measures of positive reactivity.

Method

Participants

Participants included 74 adult undergraduate Exeter University psychology students completing the experiment for course credit. Missing or incomplete data and the presence of exclusion criteria brought the sample down to 71. Participants were screened for dyslexia, vision and hearing impairments, of which none were reported. Inclusion criteria included fluency in English, being aged between 18 and 65, and falling in the normal IQ range. Due to the nature of the trauma video in the experiment, it was necessary to identify individuals who may be particularly vulnerable to experiencing distress at viewing traumatic material. Therefore exclusion criteria included a previous history of trauma assessed using the Primary care PTSD screen (Prins et al., 2004) and anyone currently engaging in

psychological therapy. One case was identified for an individual who declined their participation upon further explanation given regarding the traumatic nature of the video.. The study was approved by the University of Exeter Psychology Research Ethics Committee. Participants gave written informed consent having read the study information sheet (see Appendix A).

A power calculation using G Power (3.1.5, Erdfelder, Buchner, & Lang, 2009) to determine the required sample to achieve 80% power for a medium effect size d=.5 (Cohen, 1992) with a .05 significance level revealed that a minimum of 42 participants (21 in each experimental condition) were required for between group analyses and that a minimum of 68 participants were required for pre-manipulation across group analyses.

Measures

Questionnaire and psychometric measures were used to check groups were comparable pre-manipulation on relevant demographic, positive reactivity, and avoidance constructs. Further, positive reactivity and avoidance measures were used to test the secondary research question (see Appendix A). All the measures below have been used widely within clinical settings and the emotion regulation literature, with good reliability and validity in clinical and non-clinical samples.

Participant characteristic measures.

National Adult Reading Test (NART; Nelson, 1982). The NART is a widely used method in clinical settings for estimating intelligence levels of English-

speaking patients, comprising of 50 unfamiliar and irregular words printed in order of increasing difficulty which participants are asked to read out loud using phonemic decoding rather than word recognition. Intelligence levels are predicted from subtracting the NART error score (50 minus number of words read correctly). which is inserted into equation the Crawford equation which calculates the predicted full-scale intelligence score (Nelson,1982). The scale has been shown to have good internal consistency, with Cronbach's alpha of 0.93 (Nelson, 1982).

Patient Health Questionnaire (PHQ-9, Kroenke, Spitzer, & Williams, 2001). The PHQ-9 is a widely used self-report measure of depression severity containing nine items relating to depressive symptoms with high internal consistency (Kroenke et al., 2001). Scores for each item range from zero to three and higher scores indicate greater depression symptom severity, with a score of ten and above representing moderate symptoms (Kroenke et al., 2001).

Generalised Anxiety Disorder scale (GAD-7 Spitzer, Kroenke, Williams, & Lowe, 2006). The GAD-7 is a widely used self-report measure of anxiety containing seven items relating to anxiety symptoms. Scores of five, ten, and 15 are taken as the cut off points for mild, moderate, and severe anxiety, respectively and the measure has adequate internal consistency (Spitzer et al., 2006).

Positive reactivity measures.

Positive and Negative Affect Scale (PANAS, Watson, Clark & Tellegen, 1988). The PANAS is a widely used self-report measure of an individuals' state

affective experience sub-divided into positive and negative affect, and the positive subscale is of particular focus in the current study. The measure consists of 20 adjectives that describe positive and negative affective experience, and participants rate to what extent they have experienced the emotion in the past few weeks, using a five point Likert scale ranging from one (very slightly or not at all) to five (extremely). Internal consistency for the subscales is adequate (Watson et al., 1988).

The Snaith Hamilton Pleasure Scale (SHAPS: Snaith, Hamilton, Morley, Humayan, Hargreaves, Trigwell, 1995). The SHAPS (Snaith et al., 1995) is a 14 item self-report measure of state anhedonia, based on respondents' ability to experience pleasure from regular typically enjoyable activities. Respondents are asked to agree or disagree with statements using a four point Likert scale ranging from one (strongly agree) to four (strongly disagree), based on their pleasure experience in the past few days. Scores above three indicate clinically relevant anhedonia symptoms, and the scale has been shown to have adequate internal consistency (Snaith et al., 1995)

The Temporal Experience of Pleasure Scale (TEPS: Gard, Gard, Kring & John, 2006). The TEPS (Gard et al., 2006) is an 18 item self-report scale measuring the trait disposition of pleasure experienced in the moment, and in anticipation of future activities, consisting of anticipatory (10 items) and consummatory (eight items) pleasure items. Participants answer each item using a six point Likert scale ranging from one (never true) to seven (always true). Lower

scores indicate greater trait disposition to experience anhedonia and adequate internal consistency for the scale identified (Gard et al., 2006).

Avoidant Emotion Regulation measures.

The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). The ERQ (Gross & John, 2003) is a self-report measure of an individual's trait emotional regulation strategies. The scale consists of ten items which make up two sub-scales measuring participants' tendency to regulate emotions using (1) Cognitive Reappraisal (participants interpret a situation in an alternative manner in order to reconsider an emotional response) and (2) Expressive Suppression (individuals express their emotional response as it is experienced) is particularly relevant in the current study. Participants answer each item using a seven point Likert scale ranging from one (strongly disagree) to seven (strongly agree). The scale has adequate internal (Gross & John, 2003).

The Acceptance and Action Questionnaire - II (AAQ-II; Bond et al., 2011). The AAQ-II (Bond et al., 2011) is a seven item self-report scale measuring trait psychological flexibility or EA, indexing the degree to which one is willing to experience negative thoughts and feelings without having to avoid them (acceptance) or have them affect the respondents' responsibilities (action). Participants answer each statement using a seven point Likert scale ranging from one (never true) to seven (always true). Higher scores indicate less experiential avoidance, with no specific cut-off for clinical samples. The measure has

satisfactory internal consistency and correlates with specific and general measures of psychopathology (Hayes et al., 2004).

The Young-Atkinson Mode Inventory (YAMI; Young, Arntz, & Weishaar, 2005). The YAMI (Young et al., 2005) is a 187 item self-report measure of trait level schema modes that an individual expresses, including a measure of the detached protector mode (18 items). This mode describes an interpersonal approach and style of relating to others that features emotional suppression. Respondents are asked to answer each item using a six point Likert scale ranging from one (never or almost never) to six (all the time) when describing themselves generally. Higher scores indicate a greater degree of trait DP mode as an expression of EA, and the scale has good internal consistency for all sub scales (Arntz et al., 2005).

Procedure

Individuals who signed up on the Psychology Experiment Management System, (for students requiring course credits) received the participant information sheet, consent form, and initial screening measures (see Appendix A). Participants that satisfied inclusion and exclusion criteria were invited to attend a one hour testing session in the Psychophysiology laboratory and were asked to identify two positive memories to recall, and two positive future events for the experiment.

Upon arrival, the information sheet was covered again to give participants opportunity to ask questions. Participants were asked to identify cue words and write two sentences outlining their chosen memories and imagined future events.

Participants were seated in front of the PC running the experiment and the electrodes measuring GSR were placed on the fingers of the non-dominant hand and electrodes measuring HR were placed below the collar bone and ribcage. A five minute rest period was recorded to compare against their psychophysiological responses during the experiment. Once the task began, a separate recording using AcqKnowledge was started. Participants then completed the experimental task, as described above (see Figure 1) and in the section below. Upon experiment completion the researcher removed the electrodes and participants completed the dispositional measures. Upon completion, participants were de-briefed about the study purpose and given their course credits.

Experimental task. The task required participants to recall one autobiographical positive memory and then describe an imagined positive future event both before and after watching an analogue trauma induction. Half of participants were randomly assigned to follow instructions intended to induce the DP mode and the other half were randomly assigned to an uninstructed control condition when viewing the video (see Figure 1).

Real life footage from Boston Marathon Bombings 2011 was edited using Audacity (a multi-track audio editor and recorder for Windows) to form a five minute clip depicting the marathon start, explosions and the aftermath involving injured spectators. The clip was intended as a negative mood induction with more recent real events and clearer footage compared to those more routinely used in the trauma film paradigm (Steil, 1996). Piloting of the video with four participants

identified it as an effective mood induction. Instructions for the control group asked them to respond to the video as they normally would. Instructions for the experimental group asked them to actively suppress emotions consistent with the DP mode (see Appendix A). Following the video, participants rated to what degree they followed the instructions prior to the video and if they looked away from the screen, using a VAS scale (1 not at all-100 extremely), as manipulation checks to ensure any statistical differences were not due to differences in instruction adherence and visual attention. Participants then completed the YAMI (Young et al., 2005) as a modified state version (from the original trait measure) of the DP mode. The scale was modified to a state version of the DP mode by altering the window of time participants are asked to consider when responding to the individual statements which was changed from ‘how you are feeling generally’ to ‘how you are feeling in this current moment’ in response to statements such as I feel bored, I feel numb (see Appendix A).

On each imagine/memory task, participants were presented with their previously chosen cue word on the screen as a prompt to describe their associated positive memory or imagined future event presented as memory one, imagined future event one (prior to the video), memory two, imagined future event two (after the video).

Prior to the video and each memory/imagine task, participants completed a neutral counting task (baseline measure of mood) counting certain items in a number matrix in 15 seconds. After the video and each counting, memory/imagine task, participants rated their average experience of happiness, sadness, fear, anger, and

disgust on a visual analogue scale (VAS) from zero (not at all) to 100 (extremely) (“How much on average did you feel the following emotions?”).

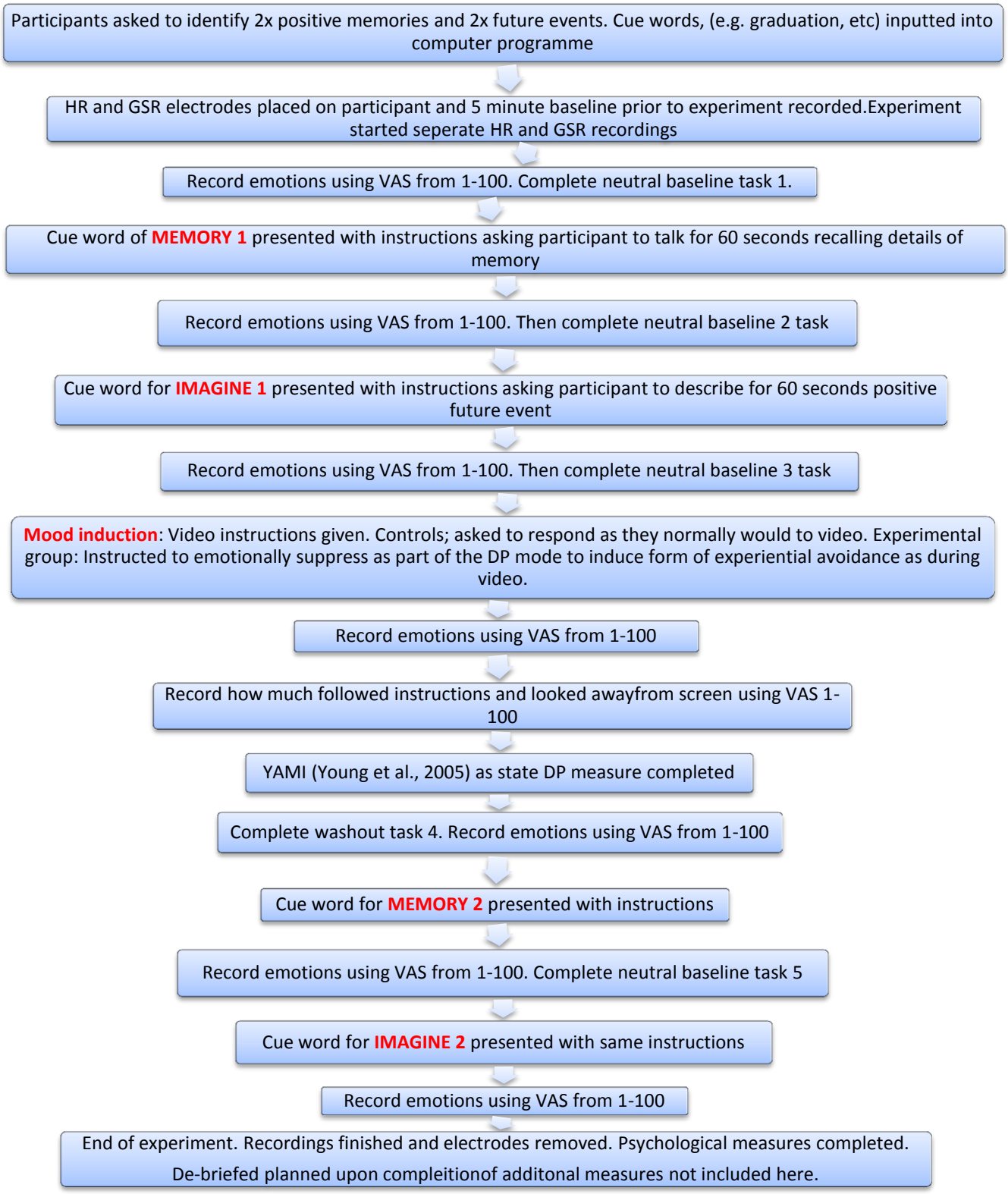

Figure 1. Flow diagram outlining the experimental procedure.

Psychophysiology recording

Galvanic skin response (GSR) and heart rate (HR) were continuously recorded (as measures of emotional responsiveness less vulnerable to demand effects) via the BIOPAC MP150 system connected to a separate computer running Acknowledge 4.2 software (BIOPAC, 1997). For GSR, two electrodes with leads attached were placed on the middle phalanges of the 1st and 2nd fingers of the participant's less dominant hand. Prior to attachment the electrode sites were cleaned with alcohol wipes to reduce buildup of isotonic gel. Participants were asked to remove any jewellery or watches and instructed to minimise movement to reduce movement noise.

For HR, active electrodes were placed below the heart and near the right collarbone and a reference electrode placed underneath the opposite ribcage. HR was determined from the R-interval of the ECG in beats per minute, with a sampling rate recorded at 1000 samples per second (Fowles, Christie, Edelberg, Grings, Lykken, & Venables, 1981). Separate variables were computed for mean GSR and HR activity during and each video, memory and imagine task and in the 10s preceding each task. These baseline recordings were then subtracted from the task averages to create psychophysiological measures of change during each video, memory and imagine task. .

Risk Procedure. Participants that scored at or above the moderate range for anxiety and depression, or had a history of trauma were excluded. A risk

procedure included the study termination for anyone experiencing distress during the experiment, and would be seen by Dr. Barney Dunn, project supervisor. Following the experiment, all participants were given the contact details of myself and project supervisor should they be experiencing distress following the study. No participants required this procedure to be followed.

Statistical analysis

All data was collated using Microsoft Excel, and analysed using SPSS (version 12). All variables were checked against normality assumptions, and any which did not conform to normal distribution where transformed using either square root, logarithmic or the reciprocal of these methods. Where appropriate, outliers (more than three standard deviations from the mean) would have been excluded, however no outliers were identified. Repeated measures ANOVAS with group (DP or control) as between and time (pre and post video) as within subject factor were conducted with positive affect, negative affect, HR and GSR as dependent variables. T tests were used to compare groups at baseline on a number of variables (Table 2). All statistical tests were two tailed with alpha set at .05. To interpret the effect sizes, medium and large effect sizes have been defined as $\eta p2$ = .06 and .14, respectively (Cohen, 1992). Throughout the analyses, any normality violations require non-parametric analyses to ideally have been run, but since no non-parametric alternative to repeated measures ANOVA exists, results using repeated measures ANOVAs should be interpreted cautiously.

Results

Analysis 1: Are groups comparable at baseline?

Where exploratory analyses revealed data were normally distributed, independent sample t-tests were conducted. Where exploratory analyses revealed data were significantly non-normal and transformations of the variables could not satisfactorily normalise the distribution (summarised in Table 1), data were analysed using non-parametric equivalents. We then established if randomisation had been successful, evaluating if participants allocated to the DP and control condition did not differ in baseline clinical and demographic measures (data and comparisons summarised in Table 2). To rule out the possibility of any confounding relationships between demographic variables and scores on psychological measures, equivalence tests were conducted (see Table 4).

Table 1

Variables that did not meet normal distributions and the type of transformation required.[8]

Variables	Logarithmic	Square Root	Inverse	Variable corrected by transformation to within a normal distribution
Age	X	X	X	No
GAD-7	X	X	X	No
PHQ-9	X	X	X	No
SHAPS	X	X	X	No
TEPS- anticipatory	X	X	X	No
TEPS- consummatory	X	X	X	No
ERQ suppression	X	X	X	No
ERQ reappraisal	X	X	X	No
AAQ-II	X	X	X	No
Trait DP	X	X	X	No
PANAS-positive	X	X	X	No
PANAS- negative	X	X	X	No
Sadness during video	X	X	X	No
Anger during video	X	X	X	No
Disgust during video	X	X	X	No
Look-away	X	X	X	No
DP Instructions	X	X	X	No
YAMI trait	X	X	X	No
Baseline happiness	X	X	X	No
Happiness memory	X	X	X	No
Happiness imagine	X	X	X	No
Fear during video	X			Yes
YAMI state	X			Yes
HR during memory	X			Yes
GSR during video	X			Yes
HR during video	X			Yes

[8] Table cells that contain X refers to the method of transformation used for that variable. No X contained in a cell refers to that method of transformation not being used.

The PANAS positive variable was significantly higher in the experimental group, p=.04, and there was a trend difference for the PHQ-9 (p=.06) and the GAD-7 (p=.07) to be higher in the control group relative to the experimental group, suggesting randomisation had not worked for these variables. For all other demographic and psychological measures variables, groups did not significantly

Table 2

Means, standard deviations and comparison test results for clinical and demographic variables for control and experimental group.

Variables	Control (*n*=36) (Mean and standard deviation)	Detached protector (*n*=35) (Mean and standard deviation)	Comparison (T test, Pearson Chi squared or Mann whitney)
Age	20.21 (4.51)	20 (2.65)	*U*(71)=536, *z*= -1.08,*p*=.28
NART errors	19.19 (6.36)	17.71 (4.94)	*t*(69)= -1.09, *p*=.28
Gender	Male 6; Female 30	Male 5; Female 30	x^2 (1, N=71)=.78, *p*=.78
Ethnicity	Other 3 British 32	3 33	x^2(1, N=71)=.4.00, *p*=.41
GAD-7	2.56 (2.16)	1.8 (2.07)	*U*(71)=478, z= -1.79, *p*=.07
PHQ-9	3.03 (2.13)	2.26 (2.28)	*U*(71)=470, z= -1.87, *p*=.06
SHAPS	21.20 (3.75)	20.51 (3.67)	*U*(71)=569.5, z= -.51,*p*=.61
TEPS-anticipatory	35.03 (12.07)	39.71 (12.45)	*U(*71)=598.5, z= -.36,*p*=.72
TEPS-consummatory	39.63 (12.07)	39.71 (12.45)	*U*(71)=496, z= -1.55,*p*=.12
ERQ suppression	14.36 (5.75)	12.89 (4.56)	*U*(71)=532, z= -1.11,*p*=.27
ERQ reappraisal	28.28 (6.68)	30.11 (6.16)	*t*(69) = 1.20, *p*=.23
AAQ-II	18.22 (7.72)	17.17 (6.15)	*U*(71)=576.5,z= -.62, *p*=.54
Trait DP	37.06 (13.12)	34.15 (11.84)	*t*(69)= -.88 *p*=.39
PANAS-positive	32.75 (5.93)	35.69 (4.57)	*U*(71)=455.5,z= 2.01,*p*=.04
PANAS-negative	18.17 (7.34)	17.91 (5.27)	*U*(71)=587, z= -.50, *p*=.62

Cronbach alpha analyses were also conducted to identify the reliabilyt of the scales in the current sample (see Table 3). All scales fell within the acceptable to very good range, with the GAD-7 (Spitzer et al., 2006) and PHQ-9 (Kroenke et al., 2001)

having the lowest alpha scores within the acceptable range, and the TEPS (Gard et al., 2006) having the highest alpha score.

Table 3

Cronbach's alphas for all measures in the current sample.

Measures	Reliability analysis (Cronbach's alpha)
GAD-7	.66
PHQ-9	.66
SHAPS	.69
TEPS	.96
ERQ	.76
AAQ-II	.85
Trait DP	.95
State DP	.91
PANAS	.79

Analysis 2. Did the manipulations work?

Inducing the DP mode. To establish if the experimental manipulation of inducing the DP mode was successful, we compared participants self-reported following of the DP instructions, and how much they looked away from the screen (see Table 2). Participants scored significantly higher on the YAMI state scores in the experimental group compared to the control group, indicating that the DP mode induction instructions worked. As intended, groups did not differ in how much they looked away, p=.31. However, the control group reported following the video instructions significantly more carefully than the experimental group, p<.001.

Table 2

Means, standard deviations and comparison test results for the manipulation check variables for control and experimental group.

Variables	Control (Mean and standard deviation)	Detached protector (Mean and standard deviation)	Comparison T Test or Mann Whitney
Instructions	81.78 (30.99)	70.86 (25.50)	*U(72)*= 367,*Z*= -3.19, *p<.001*.
Lookaway	7.72 (22.01)	6.54 (10.10)	*U(72)*= 468.5, *Z*= 1.01,*p*=.31
YAMI-State	33.33 (9.75)	46.53 (17.14)	*t*(70)= 4.02, *p*<.001

Participants' ratings of subjective emotion and psychophysiological response during the video. Next we examined change in subjective emotion experience and psychophysiological response during the video as a function of group to test the hypothesis;

- Participants asked to follow DP instructions will demonstrate reduced subjective reactivity but an increase in psychophysiological responses compared to controls when viewing the trauma video.

Exploratory analyses revealed some of these ratings were significantly non-normal and not corrected by transformation or exclusion. Figure 2 plots happiness ratings during the neutral counting task preceding the video and during the video. All graphs have error bars on all representing one standard error of the mean. First we established that the groups did not differ in their response to the baseline counting task prior to the video with no group difference for happiness, sadness, anger, fear or disgust ratings, *Us*< 590, *ps*>.41 (see Table 3).

Table 3

Means, standard deviations and comparison test results for subjective emotion variables during the baseline counting task and the video for control and experimental groups.

Variables	Control (Mean and standard deviation)	Detached protector (Mean and standard deviation)	Comparison Mann Whitney
Baseline happiness	60.61 (24.67)	63.58 (20.89)	*U(72)*= 648, *Z*= .0,*p*=1
Video happiness	6.06 (9.28)	9.08 (15.92)	*U(72)*= 633.5, *Z*= -.17,*p*=.87
Baseline sadness	2.08 (8.33)	3.25 (8.97)	*U(72)*= 585, *Z*= -.82,*p*=.41
Video sadness	79.81 (18.69)	55.17 (28.34)	*U(72)*= 293.5, *Z*= -4, *p<.001*
Baseline disgust	.31 (.62)	.5 (1.08)	*U(72)*= 607, *Z*= -5.84,*p*=.56
Video disgust	67.44 (31.46)	47.14 (35.23)	*U(72)*= 431, *Z*= -2.45,*p*=.01
Baseline fear	.31 (.62)	.67 (1.27)	*U(72)*= 590, *Z*= -.76,*p*=.45
Video fear	45.14 (27.59)	24.36 (25.51)	*U(72)*= 359,*Z*= -2.45, *p<.001*
Baseline anger	.36 (.72)	1.28 (3.67)	*U(72)*= 588, *Z*= -.85,*p*=.40
Video anger	60.31 (28.64)	32.94 (31.67)	*U(72)*= 336, *Z*= -3.52,*p<.001*

To analyse change in happiness ratings, a repeated measures ANOVA was run with time (baseline, video) as the within-subjects factor and condition (detached protector, control) as the between subjects factor. This found a main effect of time, $F(1,70)=378.80$, $p<.001$, $\eta_p^2 =.84$ but no time by condition interaction, $F(1,70) =.00$, $p=.99$, $\eta_p^2 =.02$ and no main effect of condition, $F(1,70) =.79$, $p=.38$, $\eta_p^2 =.01$ Thus, happiness ratings decreased from baseline to the video but this did not vary with group. Therefore, while the video worked as intended, the DP instructions did not. Figure 2 plots happiness ratings during the neutral baseline before the video and during the video.

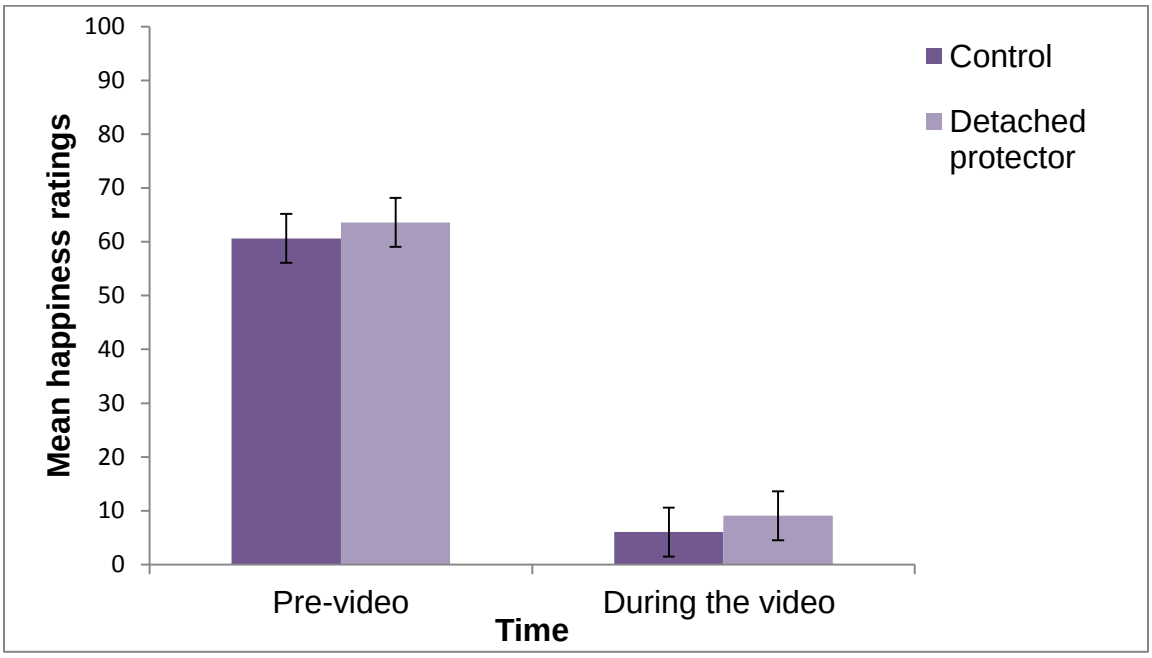

Figure 2. Happiness ratings during the neutral baseline before the video and during the video. Error bars represent one standard error of the mean.

Figure 3 plots sadness, fear, disgust and anger ratings during the counting task preceding the video and when watching the video. A repeated measure ANOVA was conducted with rating (baseline, video) and emotion (sadness, disgust, anger, fear) as within subjects factors and condition (control, detached protector) as a within-subjects factor. This found a main effect of time, $F(1,70)=326.31$, $p<.001$, $\eta_p^2=.82$, with greater negative emotion during the video than the neutral baseline, indicating the video increased negative affect as intended. There was also a main effect of emotion, $F(1,69)=40.73$, $p<.001$, $\eta_p^2=.28$ (sadness>disgust>anger>fear) and a significant time by emotion interaction, $F(1,69)=31.31$, $p<.001$, $\eta_p^2=.15$, indicating there was an increase in the negative emotions from before to after the video, as intended by the analogue mood induction. There was a main effect of condition,

F(1,69) = 17.58, *p*<.001, η_p^2=.20 with the DP group reporting less negative affect overall than the control group. Critically, there was a time by condition interaction, *F*(1,69)=17.90, *p* <.001, η_p^2=.20 with the DP group showing a smaller increase in negative emotions in the video compared to the counting task relative to the control group, consistent with hypothesis one. There was no emotion by condition interaction or time by emotion by condition interaction, *F*s <1, η_p^2=.01.

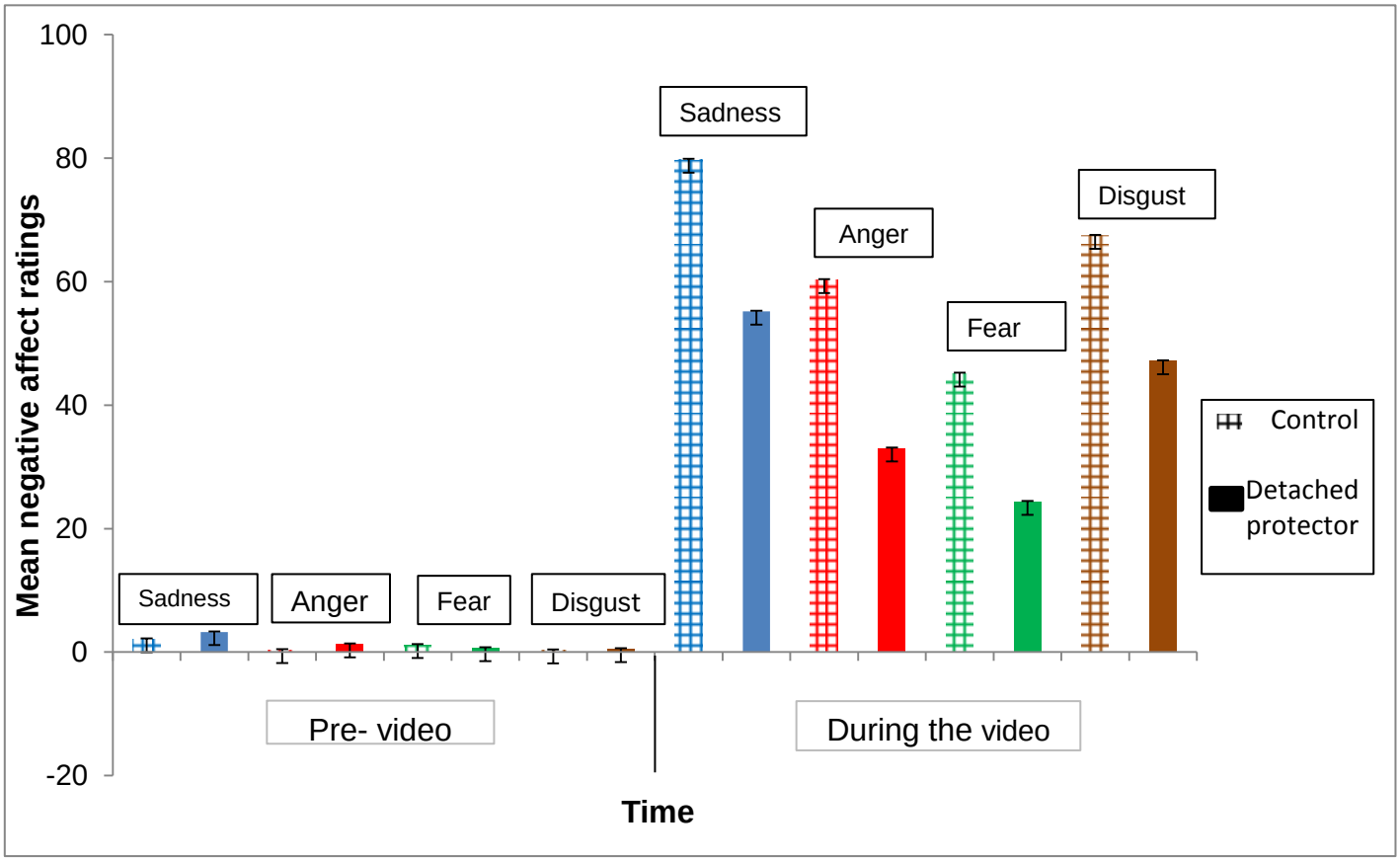

Figure 3. Negative affect ratings; sadness, fear, disgust and anger ratings during the baseline preceding the video and during the video. Error bars represent one standard error of the mean.

Figure 4 plots HR activity during the ten seconds baseline preceding the video and when watching the video. Exploratory analyses revealed ratings were significantly non-normal and corrected by logarithmic transformation. Groups did not differ in mean HR during the baseline (see Table 4).

Table 4

Means, standard deviations and comparison test results for psychophysiological response variables during the baseline counting task and the video for control and experimental groups

Variables	Control (Mean and standard deviation)	Detached protector (Mean and standard deviation)	Comparison T Test or Mann Whitney
Baseline GSR	14.27 (7.87)	15.39 (8.18)	*U(70)*= 580,*Z*= -.38, *p=.70*.
Video GSR	14.59 (6.86)	16.11 (7.69)	*U(70)*= 554, *Z*= -.69,*p*=.49
Baseline HR	82.47 (7.87)	80.44 (13.25)	*t*(68)= -.57*, p*=.57
Video HR	80.67 (18.43)	76.19 (11.51)	*t*(68)= -1.22, *p*=.23

To analyse average HR, a repeated measures ANOVA was run with time (baseline, video) as the within-subjects factor and condition (detached protector, control) as the between subjects factor. This found a main effect of time, $F(1,68)=13.40$, $p<.001$, $\eta_p^2= .17$, with HR unexpectedly *decreasing* while watching the video. There was no time by condition interaction, $F(1,68) = .16$, $p=.68$, , $\eta_p^2= .01$, and no main effect of condition, $F(1,68) =.60$, $p=.44$, $\eta_p^2= .01$ indicating instructions had no significant impact on HR response (failing to support predictions).

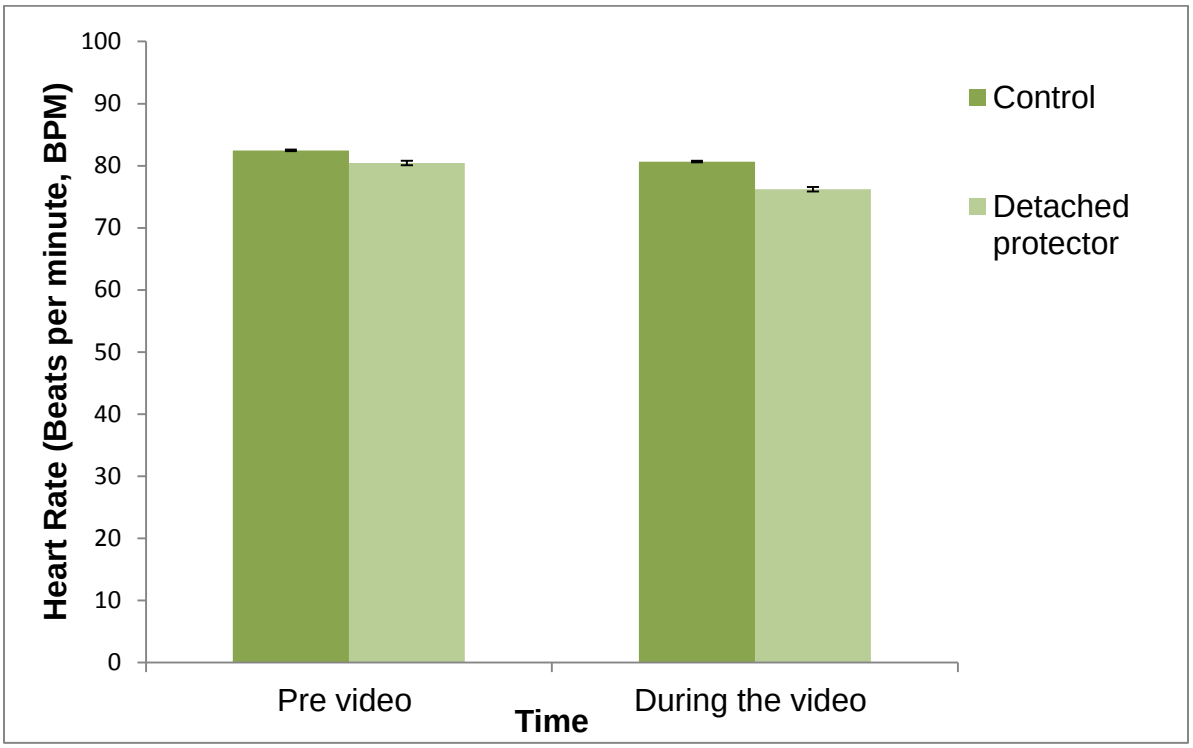

Figure 4. HR activity during the ten seconds baseline preceding the video and during the video. Error bars represent one standard error of the mean.

Figure 5 plots GSR ratings during the ten seconds baseline preceding the video and when watching the video. Non-parametric analyses revealed that baseline GSR responses measured ten seconds before the video were comparable between groups (see Table 4). To analyse GSR ratings, comparable analyses found a main effect for time, $F(1,68)=3.89$, $p= .05$, $\eta_p^2=.05$, with GSR increasing from baseline to video. There was no time by condition interaction, $F(1,68) =.56$, $p=.46$, $\eta_p^2=.00$ and no main effect of condition, $F(1,68) =.53$, $p=.47$, $\eta_p^2=.01$, indicating no effect of following DP instructions (failing to support predictions).

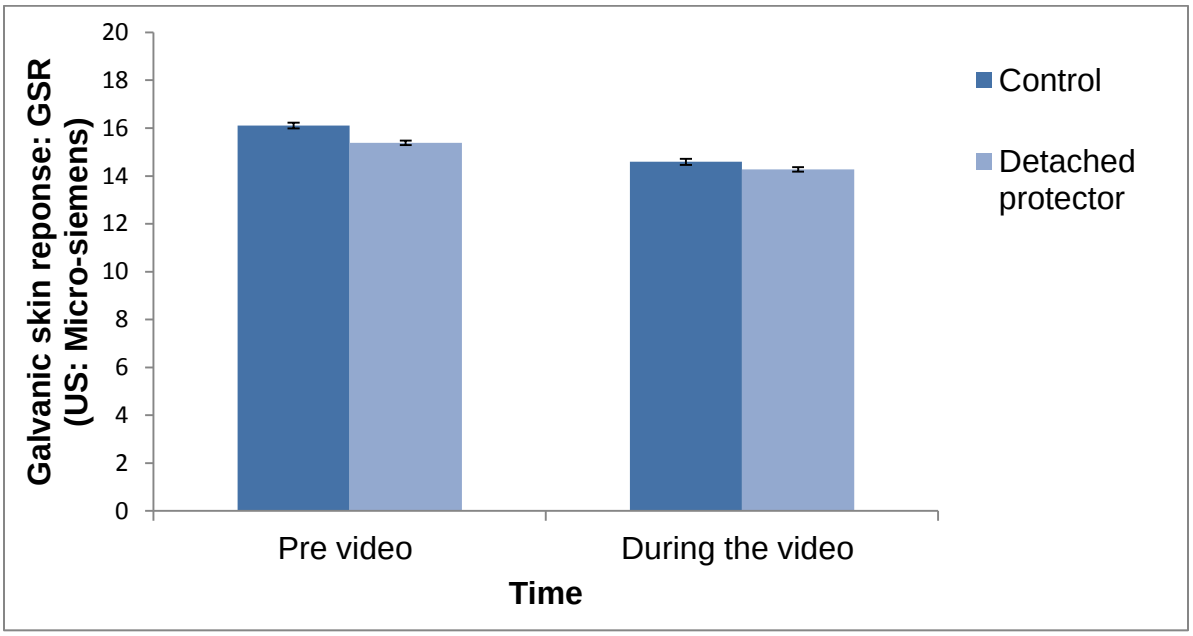

Figure 5. GSR activity during ten seconds baseline preceding the video and during the video. Error bars represent one standard error of the mean.

Overall, the manipulation worked at inducing negative emotions and reducing positive affect as intended by mood induction. HR decreased from baseline to video, which is counter to the mood induction intended to increase HR. GSR recordings increased from baseline to video for both groups, as intended by mood induction. Therefore, the DP instructions successfully reduced negative affect, but had no impact on positive affect, HR, or GSR response.

Analysis 3: Impact of video viewing on positive emotional reactivity

Differences in subjective emotion ratings for memory/imagine tasks. Participants' ratings on subjective measures of happiness immediately prior to, and following both memory and imagine tasks, were examined to test hypothesis two;

- Participants in the induced detached protector group will demonstrate reduced levels of positive self-reported affect during the memory and imagine tasks compared to controls.

Happiness ratings for memory tasks. Figure 6 plots change in happiness ratings from the baseline before the memory to during the memory recall task for participants in each group. First we established that groups did not significantly differ in emotional response during the neutral counting tasks preceding each memory recall, using Mann Whitney U tests as data were significantly non-normal. Groups were comparable on baseline happiness ratings for the first memory and second memory task (see Table 5).

Table 5

Means, standard deviations and comparison test results for happiness ratings during the baseline counting tasks, memory and imagine tasks for control and experimental groups.

Variables	Control (Mean and standard deviation)	Detached protector (Mean and standard deviation)	Comparison T Test or Mann Whitney
1st Baseline happiness	64.06 (22.09)	67.58 (19.53)	*U (72)*=613.5,*Z*= -.39, *p=.70*.
1st Memory happiness	82.86 (18.14)	82.69 (15.56)	*U(72)*=606.5,*Z=-.47*,*p*=.64
2nd Baseline happiness	33.56 (21.30)	37.78 (26.72)	*U(72)*=591.5,*Z=-.64*,*p*=.52
2nd Memory happiness	71.36 (18.44)	69.58 (19.05)	*U(72)*=599.5,*Z=-54*,*p*=.59
1st Baseline happiness	63.81 (24.24)	66.47 (19.34)	*U(72)*=638.5,*Z=-1.07p*=.91
1st Imagine happiness	78.33 (20.07)	80.25 (15.30)	*U(72)*=644.5,*Z=-.04*,*p*=.97
2nd Baseline happiness	47.69 (24.90)	50.56 (25.44)	*U(72)*=619.5,*Z=-.32*,*p*=.75
2nd Imagine happiness	72.81 (17.74)	70.89 (18.34)	*U(72)*=595.5,*Z=-.59*,*p*=.55

To analyse happiness ratings, a repeated measures ANOVA was run with time (pre video, post video) and rating (pre memory baseline, memory) as within-subjects factors and condition (control, detached protector) as a between subjects factor. Analysis revealed a main effect of rating, $F(1,70)=172.02$, $p<.001$, $\eta_p^2=.07$ with happiness increasing from the baseline task rating to the memory task rating as expected. There was a main effect of time, $F(1,70)=97.80$, $p<.001$, $\eta_p^2=.58$ with

happiness ratings being higher prior to the video than following the video, qualified by an interaction between time and rating, $F(1,70)=54.37$, $p<.001$, $\eta_p^2=.44$. The increase in happiness from baseline to memory was more marked for the memory following the video than the memory prior to the video, due to participants starting from a lower happiness level immediately after the video. There were no main or interaction effects of condition, greatest $F=1.51$, smallest $p=.22$, $\eta_p^2=.02$ indicating that following DP instructions had no impact on happiness response during memory recall (failing to support predictions).

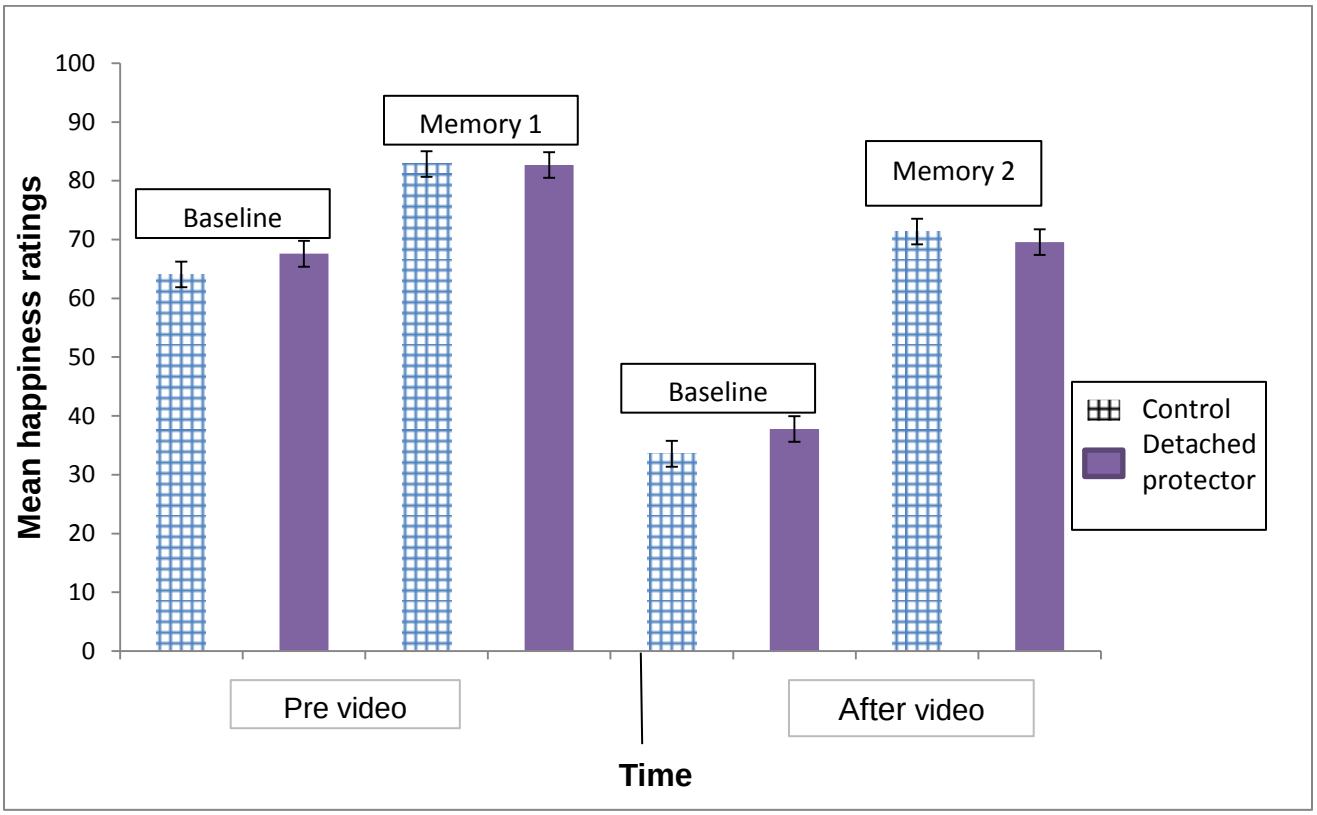

Figure 6. Happiness ratings before the memory to during the memory recall task. Error bars represent one standard error of the mean.

Happiness ratings for imagine tasks. Figure 7 plots change in happiness ratings during the imagine task for participants in each group. Non-parametric analyses revealed that baseline ratings measured ten seconds before the first imagine task and second imagine task were comparable between groups (see Table 5).

Comparable analyses run for the imagine task revealed a main effect of rating, $F(1,70)=62.56$, $p<.001$, $\eta_p^2=.47$, with happiness increasing from baseline to the imagine task as expected (see Table 5). There was a main effect of time, $F(1,70)=38.45$, $p<.001$, $\eta_p^2=.35$, with happiness ratings higher prior than following the video, qualified by an interaction between time and rating, $F(1,70)=12.31$, $p<.001$, $\eta_p^2=.15$. The increase in happiness from baseline to imagine task was more marked for the imagine task following than prior to the video. There were no main or interaction effects of condition, greatest $F=.71$, smallest $p=.41$, greatest $\eta_p^2=.01$ indicating that following DP instructions had no impact on happiness responses during the imagine tasks (failing to support predictions).

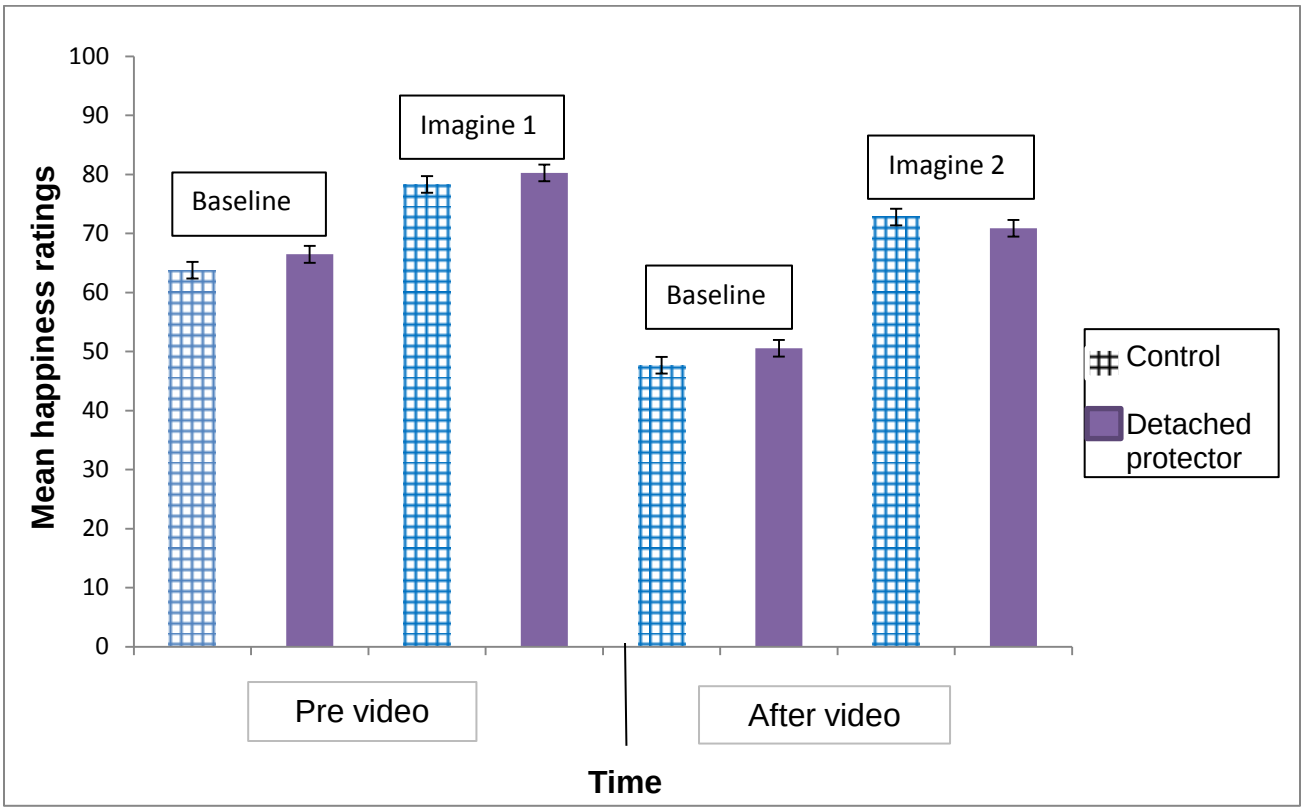

Figure 7. Happiness ratings before the imagine tasks to during the imagine positive future event tasks. Error bars represent one standard error of the mean.

Sadness ratings for memory tasks. Using sadness ratings as a single measure of negative affect for analyses provided a closer comparison to happiness ratings (Frewen et al., 2012), compared to other negative affects measured, (i.e. fear, anger, and disgust) and reduced the number of comparisons being run**.** Comparable analyses to happiness ratings were conducted for sadness ratings to test hypothesis three;

- Participants in the induced detached protector group will demonstrate reduced levels of negative self-reported affect during the memory and imagine tasks compared to controls.

Figure 8 plots change in sadness ratings during the memory recall task for participants in each group. Non-parametric analyses revealed that baseline sadness ratings measured ten seconds before the first memory task and second memory task showed a trend difference for groups to have differed before the second memory task (see Table 6). This may be because after the video, the control group started the second memory task with higher sadness ratings than the experimental group.

Table 6

Means, standard deviations and comparison test results for sadness ratings variables during the baseline counting tasks, memory and imagine tasks for control and experimental groups.

Variables	Control (Mean and standard deviation)	Detached protector (Mean and standard deviation)	Comparison T Test or Mann Whitney
1st Baseline sadness	4.89 (13.04)	7.61 (16.75)	*U(72)*= 577,*Z*= -.91, *p=.36*.
1st Memory sadness	9.67 (17.02)	5.25 (12.40)	*U(72)*= 507,*Z*= -1.7, *p=.09*.
2nd Baseline sadness	40.25 (31.00)	24.75 (25.09)	*U(72)*= 479.5,*Z*= -1.91,*p=.06*
2nd Memory sadness	26.33 (23.45)	16.86 (19.08)	*U(72)*= 492,*Z*= -1.76, *p=.08*
1st Baseline sadness	3.36 (7.53)	3.89 (11.63)	*U(72)*= 529.5,*Z*= -1.49,*p=.14*
1st Imagine sadness	5.53 (10.79)	7.53 (16.50)	*U(72)*= 639,*Z*= -.11, *p=.91*
2nd Baseline sadness	18.39 (22.01)	12.50 (19.23)	*U(72)*= 539.5,*Z*= -1.26,*p=.21*
2nd Imagine sadness	20.67 (24.61)	11.33 (19.73)	*U(72)*= 516.5,*Z*= -1.52,*p=.13*

Comparable analyses were run and revealed a main effect of time, $F(1,70)=63.46$, $p<.001$, $\eta_p^2=.48$, with sadness higher after than before the video. Analysis also revealed a main effect of rating, $F(1,70)=5.50$, $p<.02$, $\eta_p^2= .07$, with sadness decreasing from the baseline to the memory task (more marked for the memory after than prior to the video), qualified by an interaction between time and rating, $F(1,70)=11.84$, $p<.001$, $\eta_p^2=.014$. A main effect of condition, $F(1,70)=4.53$ $p=.04$, $\eta_p^2=.06$ indicates higher sadness levels experienced by the control group relative to the experimental group.

This main effect was qualified by a significant time by condition interaction $F(1,70)=5.23$, $p=.03$, $\eta_p^2=.05$ and a non-significant trend for an interaction between time, condition and rating, $F(1,70)= 3.50$, $p=.07$, $\eta_p^2=.05$. There was no interaction between rating and condition, $F(1,70)=.02$, $p=.89$, $\eta_p^2=.03$ These results suggest that following DP instructions resulted in a smaller decrease in sadness ratings from the video to the memory task relative to the control group. This may indicate that the control group benefited more from recalling the second positive memory by repairing their negative affect post video to a greater extent than the experimental group. However, this may be due to the control groups' higher sadness ratings post video.

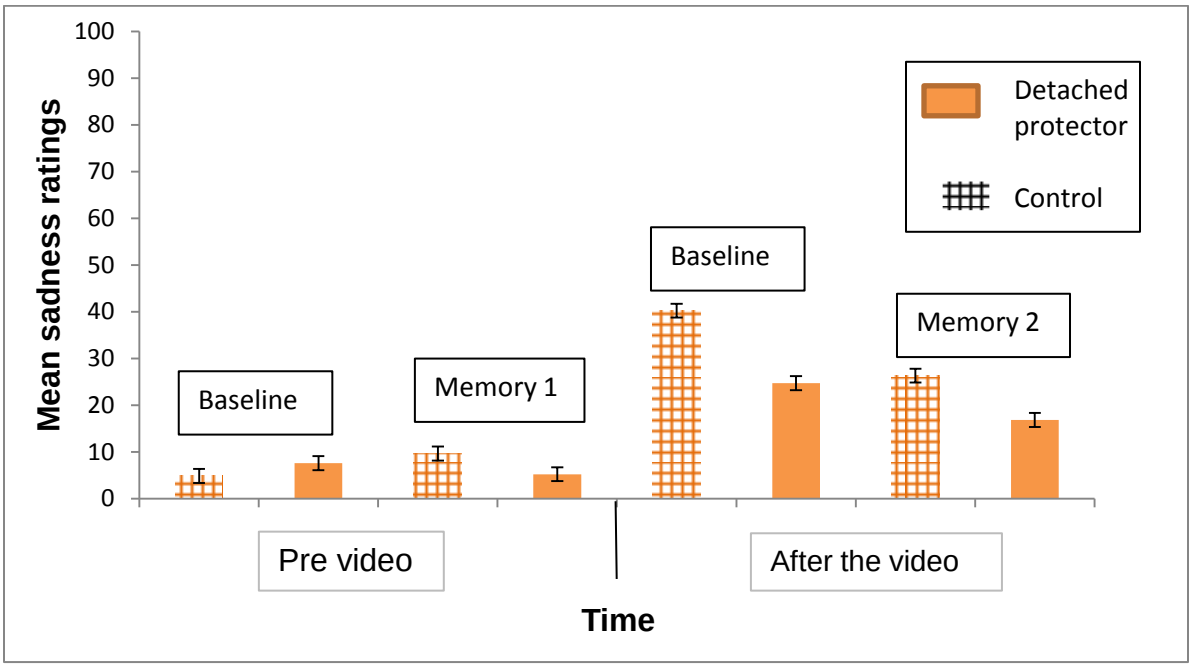

Figure 8. Sadness ratings from baseline to during the memory recall task. Error bars represent one standard error of the mean.

Sadness ratings for imagine tasks. Figure 9 plots change in sadness ratings during the imagine task for participants in each group. Non-parametric analyses (non-normal distribution not corrected by transformation or exclusion) revealed that baseline sadness ratings ten seconds before the first imagine task and second imagine task were comparable between groups (see Table 6).

Analysis revealed a main effect of time, $F(1,70)=23.29$, $p<.001$, $\eta_p^2= .25$ with sadness ratings being higher after the video than before. There were no significant effects of rating, $F(1,70)=2.19$, $p=.14$, $\eta_p^2= .03$, indicating no change in sadness ratings from the baseline to the imagine tasks. There was a significant interaction between time and condition $F(1,70)=4.05$, $p=.05$, $\eta_p^2=.06$, suggesting that following the DP instructions resulted in lower sadness ratings from the video relative to the

control group, offering weak support for experimental predictions. There was no significant interaction between time and rating, $F(1,70)=.90$, $p=.35$, $\eta_p^2=.01$ and no significant interaction between time, rating and condition $F(1,70)=.98$, $p=.33$, $\eta_p^2=.01$ and no main effect of condition, $F(1,70)=1.12$, $p=.30$, $\eta_p^2=.02$

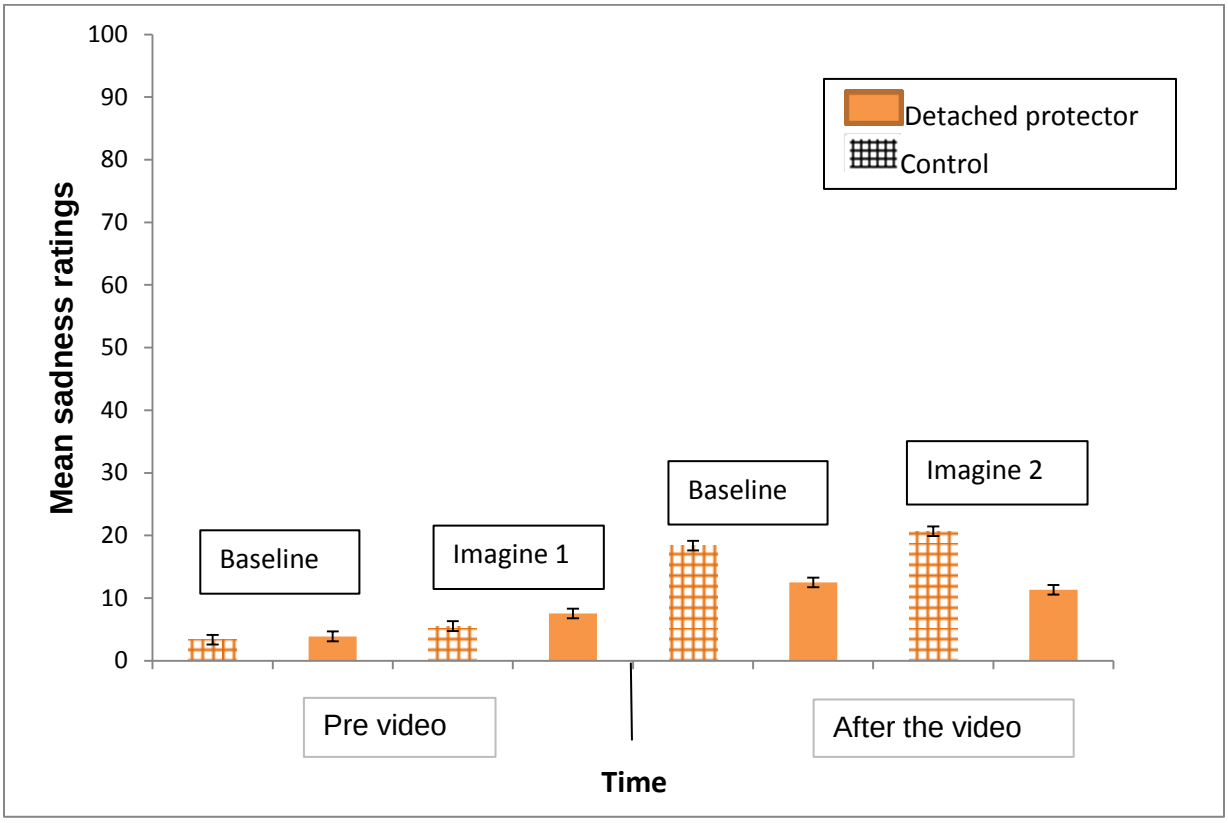

Figure 9. Sadness ratings from baseline to during the imagine tasks. Error bars represent one standard error of the mean.

Psychophysiological responses to memory tasks. Participants' HR and GSR ratings immediately prior to, and following both memory and imagine future events tasks, were examined to test hypothesis three;

- Participants in the induced detached protector group will demonstrate increased levels of psycho-physiological response during the memory and imagine tasks compared to controls.

Figure 10 plots change in HR ratings during the memory recall task for participants in each group. Non-parametric analyses (non-normal distribution not corrected by transformation or exclusion) revealed that baseline HR and GSR responses ten seconds before the first and second memory tasks and first and second imagine tasks were comparable between groups (see Table 7).

Table 7

Means, standard deviations and comparison test results for psychophysiological response variables during the baseline counting tasks, memory and imagine tasks for control and experimental groups.

Variables	Control (Mean and standard deviation)	Detached protector (Mean and standard deviation)	Comparison T Test or Mann Whitney
Baseline 1st GSR	81.78 (30.99)	70.86 (25.50)	*U(72)*= 514, *Z*=*-1*.16,*p*=.25
1st Memory GSR	7.72 (22.01)	6.54 (10.10)	*U(72)*= 526, *Z*=*-1*.02,*p*=.31
Baseline 2nd GSR	15.85 (8.91)	17.40 (9.76)	*U(72)*= 567, *Z*=-.53,*p*=.59
2nd Memory GSR	17.32 (8.49)	19.01 (9.67)	*U(72)*= 578, *Z*=-.41,*p*=.69
Baseline 1st HR	88.20 (15.61)	86.20 (13.33)	*U(72)*= 581,*Z*= -.37, *p*=*.71*.
1st Memory HR	96.23 (16.21)	94.39 (17.81)	*U(72)*= 591, *Z*=-.25,*p*=.80
Baseline 2nd HR	89.57 (20.30)	84.24 (14.60)	*U(72)*= 533, *Z*=-.93,*p*=.35
2nd Memory HR	92.07 (14.83)	90.02 (14.61)	*U(72)*= 598, *Z*=-.17,*p*=.87
Baseline 1st GSR	15.01 (6.77)	17.41 (7.71)	*U(72)*= 564, *Z*=-.57,*p*=.57
1st Imagine GSR	16.51 (7.12)	18.75 (8.45)	*U(72)*= 598, *Z*=-.17,*p*=.87
Baseline 2nd GSR	16.35 (7.85)	16.99 (8.28)	*U(72)*= 610, *Z*=-.03,*p*=.98
2nd Imagine GSR	17.48 (7.04)	18.69 (9.18)	*U(72)*= 611, *Z*=-.02,*p*=.99
Baseline 1st HR	87.63 (21.83)	82.67 (13.14)	*U(72)*= 514, *Z*=*-1*.67,*p*=.25
1st Imagine HR	92.66 (17.04)	90.48 (15.01)	*U(72)*= 533, *Z*=-.94,*p*=.35
Baseline 2nd HR	86.13 (18.22)	84.31 (15.45)	*U(72)*= 600, *Z*=-.15,*p*=.88
2nd Imagine HR	89.34 (15.77)	86.92 (13.31)	*U(72)*= 600, *Z*=-.15,*p*=.88

To analyse HR, a repeated measures ANOVA was run with time (pre video, post video) and rating (baseline HR, HR during memory) as within-subjects factors and condition (control, detached protector) as a between subjects factor. Analysis revealed a main effect of rating, $F(1,68)=39.82$, $p<.001$, $\eta_p^2=.37$, with HR increasing from baseline to the memory task as expected. There was a trend effect of time, $F(1,68)=3.70$, $p=.06$, $\eta_p^2=.05$, with HR ratings tending to be higher prior to the video than following the video, qualified by an interaction between time and rating,

F(1,68)=7.82, *p*=.007, η_p^2=.10. The increase in HR responses from baseline to memory was more marked for the memory prior to than following the video, due to participants starting from a higher HR response immediately after the video. There were no main or interaction effects of condition, greatest *F*= 7.82, smallest *p*=.34, greatest η_p^2=.12, and no significant three way interaction for time, rating and condition *F*(1,68)=1.21, *p*=.28, η_p^2=.02, showing that following DP instructions had no impact on HR responses during memory recall (failing to support predictions).

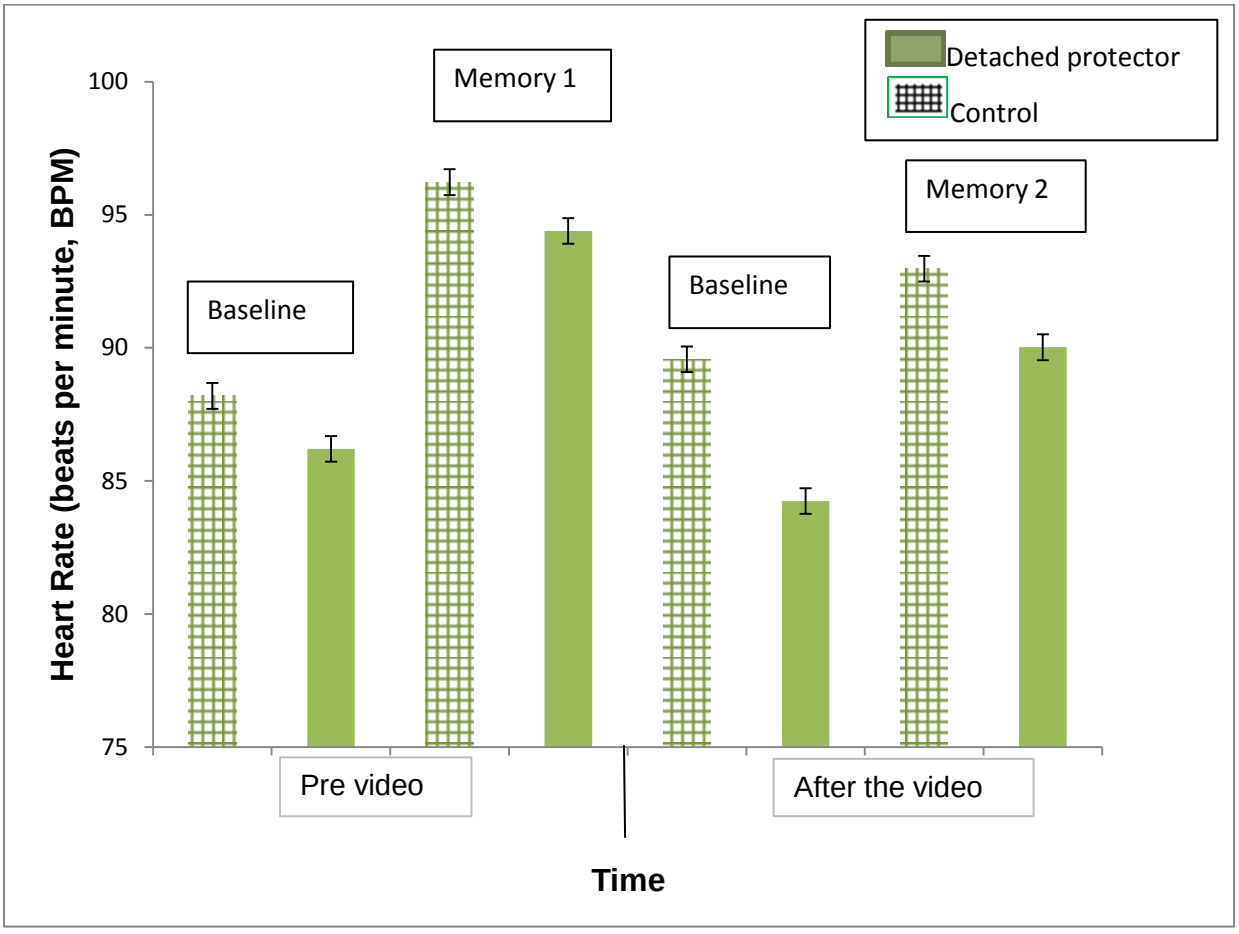

Figure 10. HR ratings from baseline to during the memory recall tasks. Error bars represent one standard error of the mean.

Figure 11 plots change in GSR ratings from baseline to during the 1st and 2nd memory recall tasks for participants in each group. Comparable analysis revealed a main effect of rating for GSR, $F(1,68)=45.97$, $p<.001$, $\eta_p^2=.40$, with GSR increasing from baseline to the memory task as expected. There was no main effect for time, $F(1,68)=1.57$, $p=.22$, $\eta_p^2=.02$ and no interactions between time and rating, $F(1,68)=2.80$, $p=.10$, $\eta_p^2=.04$ There were no main effects or interactions for condition, greatest $F=1.17$ and smallest $p=.28$, greatest $\eta_p^2=.04$ and no significant three way interaction between time, rating and condition $F(1,68)=1.15$, $p=.29$, $\eta_p^2=.02$ indicating that following DP instructions had no impact on GSR during the memory recall (failing to support predictions).

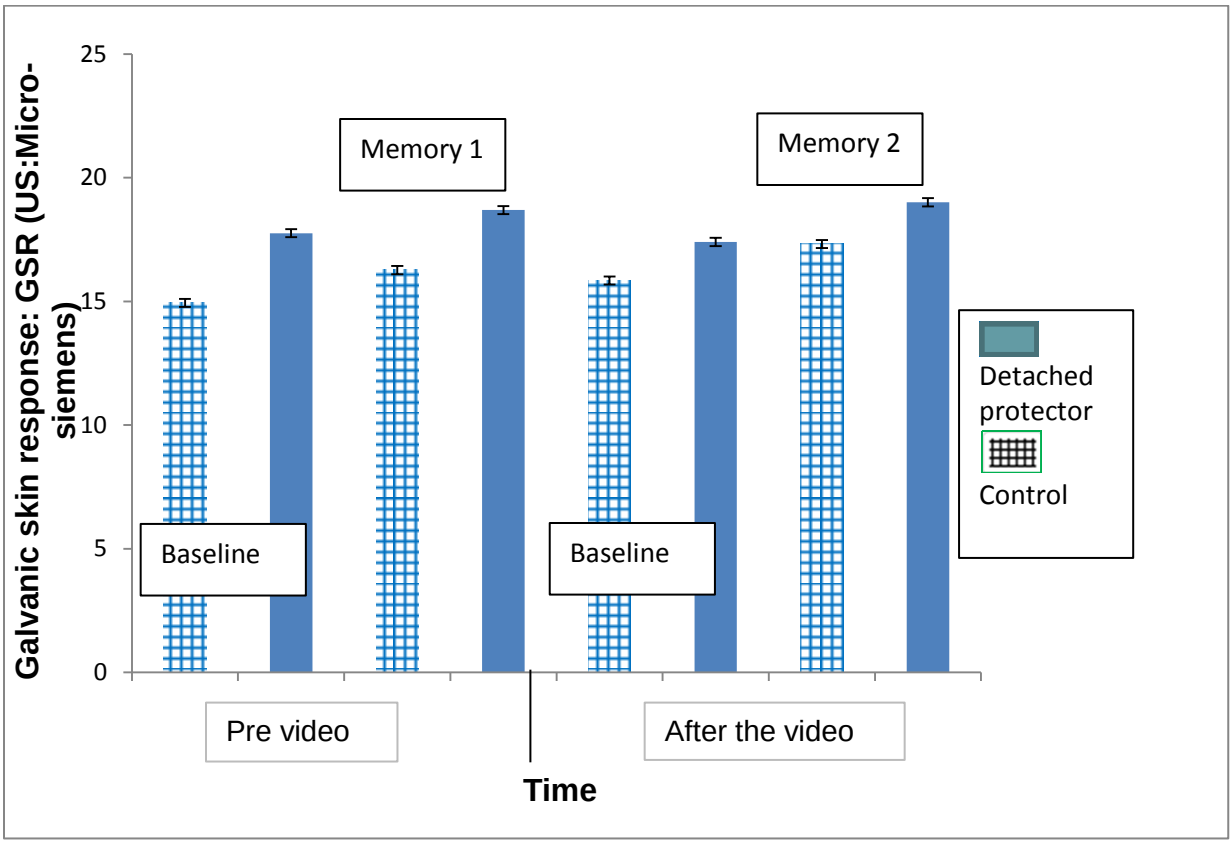

Figure 11. GSR ratings from baseline to during the memory recall tasks. Error bars represent one standard error of the mean.

Psychophysiological responses to Imagine tasks. Participants' HR and GSR ratings immediately prior to, and following the imagine future events tasks, were examined to test hypothesis four;

- Participants in the induced detached protector group will demonstrate increased levels of psycho-physiological response during the memory and imagine tasks compared to controls.

Figure 12 plots change in baseline HR recordings ten seconds before HR ratings during the imagine task for participants in each group. Analysis revealed a main effect of rating, $F(1,68)=22.12$, $p<.001$, $\eta_p^2=.25$, with HR increasing from baseline to the imagine task as expected. There was for a significant trend for time, $F(1,68)=3.45$, $p=.07$, $\eta_p^2=.05$, with HR responses higher prior to than following the video, qualified by an interaction between time and rating, $F(1,68)=4.14$, $p=.05$, $\eta_p^2=.06$. The increase in HR responses from baseline to imagine task was more marked for the imagine task prior to than the imagine task following the video, due to participants starting from a higher HR level after the video. There was a non-significant time, by rating by condition interaction, $F(1,68)=.96$, $p=.33$, $\eta_p^2=.01$, and no main or interaction effects of condition, greatest $F=.63$, smallest $p=.33$, greatest $\eta_p^2=.01$, demonstrating that following detached protector instructions had no impact

on HR responses during the imagine tasks (offering no support for experimental predictions).

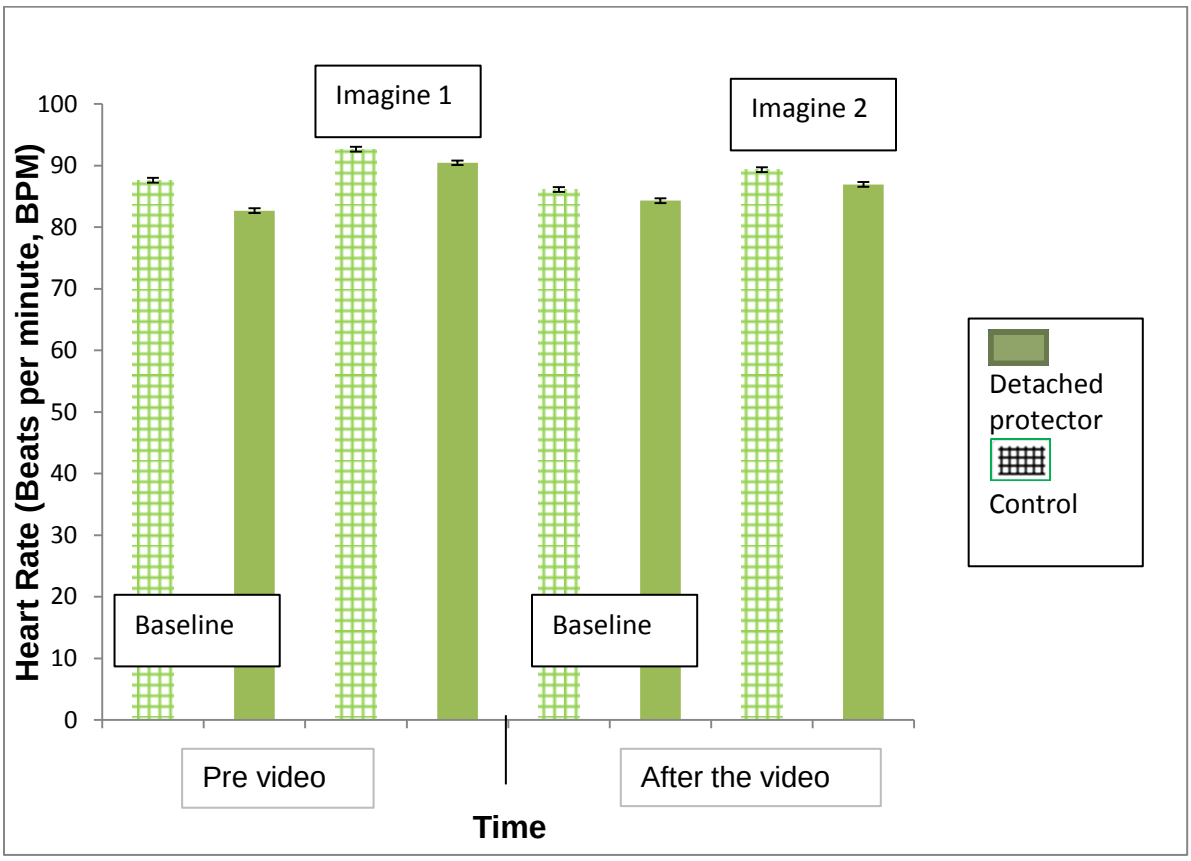

Figure 12. HR activity from baseline ten seconds before to during the imagine tasks. Error bars represent one standard error of the mean.

Figure 13 plots change in baseline GSR recordings ten seconds before GSR ratings during the imagine task across groups. Comparable analysis revealed a main effect of rating, $F(1,68)=52.29$, $p<.001$, $\eta_p^2 =.40$, with GSR increasing from the washout task rating to the imagine task rating as expected. However, there was no main effect for time, $F(1,68)=2.10$, $p=.15$, $\eta_p^2 =.03$ showing that changes in GSR were not significantly different from before to after the video. There was no time by

rating interaction $F(1,68)=.00$, $p=.99$, $\eta_p^2=.00$ and no main effect of condition, $F(1,68)$, $=.75$, $p=.39$, $\eta_p^2=.01$ but there was a significant interaction for time and condition $F(1,68) = 5.07$, $p=.03$, $\eta_p^2=.07$, suggesting that group membership affected the degree of GSR change. This was qualified by a difference approaching significance for the three way interaction between time, rating and condition $F(1,68)=5.07$, $p=.06$, $\eta_p^2=.07$, indicating that both groups showed comparable GSR response for the first imagine task. For the 2nd imagine task, following the detached protector instructions led to a larger GSR response compared to the 1st task. These results demonstrate that following detached protector instructions had no significant impact on GSR responses during the imagine tasks overall (offering no support for experimental predictions).

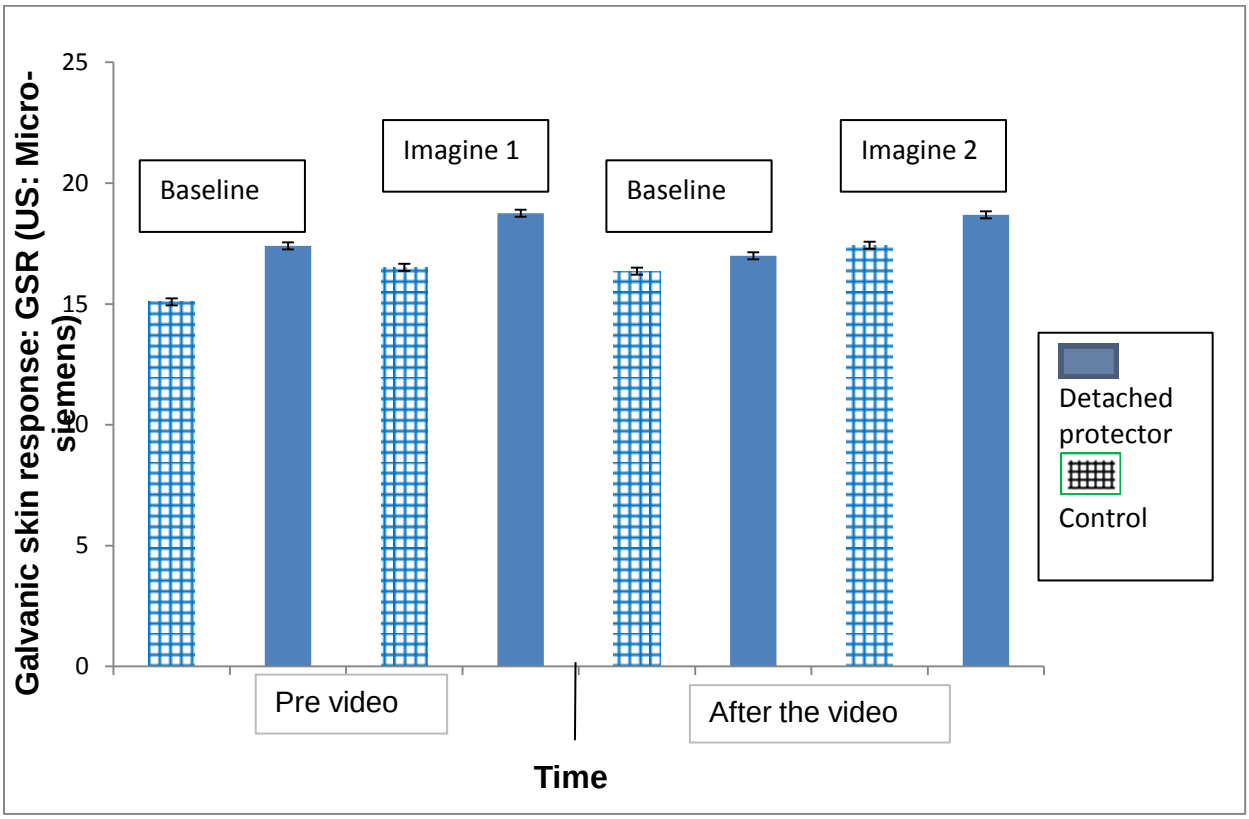

Figure 13. GSR activity at baseline ten seconds before and during imagine tasks. Error bars represent one standard error of the mean.

Analysis 4: Are trait measures of detached protector related to emotional responsivity?

Due to the predominantly non–normal distribution of the variables, non-parametric correlations using Spearman's Rho (Field, 2007) were used to explore hypothesis four:

- Higher scores on the psychological measures pertaining to experiential avoidance and emotional suppression will be associated with reduced levels of positive affect experienced in laboratory conditions and questionnaire measures of positive reactivity.

Correlations were run to examine associations between trait emotional avoidance measures, trait personality measures of emotional responsiveness and experimental state happiness reactivity to the memory and imagine task prior to the negative mood induction (see Table 8).

Table 8.

Correlations for measures of EA, positive emotional responsiveness and laboratory positive reactivity prior to experimental manipulation.

Measures of Experiential avoidance	Measure of emotional responsiveness Positive			Laboratory Happiness Ratings	
	TEPS Consummatory Sub Scale	TEPS Anticipatory sub scale	PANAS positive subscale	Memory happiness reactivity	Imagine happiness reactivity
AAQ-II	*r*(71) = .08 *p*=.51	*r*(71) = -.16 *p*=.19	*r*(71) = -.11 *p*=.35	*r*(71) = -.02 *p*=.88	*r*(67) = -.08 *p*=.46
ERQ Suppression	*r*(71) = -.16 *p*=.19	*r*(71) = -.15 *p*=.21	*r*(71) = -.08 *p*=.51	*r*(71) =.18 p=.14	*r*(71) = -.01 *p*=.91
Trait DP	*r*(67) = .08	*r*(67) = -.15	*r*(67) = -.08	*r*(67) = .21	*r*(67) = -.03

	p=.65	*p*=.23	*p*=.52	*p*=.09	*p*=.81

Happiness reactivity (separately for memory and imagine tasks) was calculated by subtracting happiness ratings before the task during the counting task from ratings during the task, to produce a simple change score. Analyses reveal that levels of trait experiential avoidance on the AAQ-II (Bond et al., 2011) and ERQ (Gross & John, 2003) suppression scales were not associated with trait levels of anhedonia or emotional reactivity in laboratory conditions, *p*s >.09. There was a trend for trait detached protector mode to *increase* the degree of happiness ratings experienced as a result of the memory task, *p*=.09, contrary to predictions. However, analyses reported in the previous section found groups were comparable at baseline for happiness ratings prior to the memory and imagine tasks prior to the manipulation, suggesting the trend did not affect experience of positive affect during the experiment. None of the other trait DP correlations were significant, *p*s>.19. Overall, correlation results provide no support that increased trait levels of DP mode are related to more positive reactivity.

Discussion

The current study addressed a gap in the understanding of anhedonia in PTSD by inducing EA using the DP mode during a negative mood induction and measuring happiness reactivity during a positive memory recall and positive imagined future events, using a pre and post design. The current study found no differential effect of following DP instructions as a form of state EA on how reactivity changed from

pre to post video or on changes in HR or GSR during from pre to post video. These results found no support for the unintentional spillover hypothesis, and are inconsistent with predictions of the existing literature. There was also no support for dispositional measures of EA associated with trait and state emotional responsivity.

Interestingly, it was found that the experimental (DP) group did experience a smaller increase in negative affect during the video compared to controls, suggesting that engaging in a level of EA is initially beneficial in reducing the experience of negative affect, which is consistent with previous research in this area, especially with clinical samples (Frewen et al., 2012, Dunn et al., 2009, Kashdan et al., 2006). This finding typically found in clinical samples may be attributed to the role of using an inflexible emotion regulation strategy such as EA, reflecting an initial motivation in using EA following trauma to reduce the experience of negative emotion. Based on this notion, it may be particularly difficult to induce and manipulate a form of EA in a non-clinical sample using an experimental analogue design. This can be attributed to the persistent nature of EA that requires repeated use as a continually and inflexibly applied emotion regulation strategy typically identified in those with PTSD (Frewen et al., 2013, Kashdan et al., 2006, Tull & Roemer, 2003). Furthermore, both groups showed a significant increase in positive affect, and a significant decrease in negative affect as a result of the positive memory recall following the video. The finding tentatively demonstrates the potential benefit of engaging in a positive task to elicit a subsequent increase in positive affect (in this case, memory recall). However, since

there was no control condition involving no positive tasks completed, changes in affect may have been due to spontaneous recovery and cannot be attributed to the experimental manipulation.

Theoretical implications

The study represents the first time the DP mode was experimentally explored using laboratory conditions, and the DP mode was successfully inducted within a non-clinical population based on clear emotion regulation instructions (see Appendix A). Furthermore, the current study provided an improved analogue trauma induction that was shown to be effective as a negative mood induction, and can be used in subsequent experiments. However, the current research raises a variety of theoretical implications and provides no support for the theory that EA consistently has detrimental consequences on emotional responsivity to cause anhedonia. The absence of an association between state EA and blunted positive emotional responsiveness as a result of the traumatic material in the laboratory setting was a surprising result, and is at odds with the findings that EA is associated with blunted positive affect (Frewen et al., 2012, Kashdan et al., 2006).

The current findings of the beneficial effects of using suppression in the short term are inconsistent with Campbell-Sills et al. (2006) who identified their suppression group manifested poorer recovery from changes in negative affect compared to the acceptance group. Inconsistent findings with Campbell-Sills et al., (2006) may be due to the non-clinical sample that was largely homogenous consisting of predominantly white, British, university students of a similar age, with substantially

more women than men. Although this was largely unavoidable due to recruitment methods, this homogenous sample could have impacted upon use of emotion regulation strategies (Garnefski, Teerds, Kraaij, Legerstee, & vandenKommer, 2004). Participation although voluntary, was for a course requirement, which may impact upon the effort of participants. Although manipulation checks were included to diminish any of these concerns, it cannot be guaranteed that all participants followed the instructions to the extent that they reported. Current results found the experimental group did not follow instructions as carefully as the control group which may have affected results.

Current findings are also inconsistent with other research in this area (Frewen et al., 2012, Tull & Roemer, 2003, Kashdan et al., 2006) which poses a challenge for the extant literature. Conversely, current findings are consistent with Dunn et al., (2009) whereby the DP mode was effective at reducing negative affect. However, the current findings did not extend the findings of Dunn et al., (2009) to support the unintentional spillover effects onto reduced positive affect. Some of the strongest evidence for the role of EA in anhedonia comes from clinical samples (Frewen et al., 2012) containing closer correlates of psychological distress (Kashdan et al., 2006). Attempts to understand a process that occurs in serious, debilitating mental health conditions over time may not be possible without using more personally salient material. Furthermore, research has shown EA to alter positive affect only in combination with hyper-arousal (Tull & Roemer, 2003), suggesting depletion of physiological resources in PTSD may lead to subsequent emotional responsivity

depletion, resulting in anhedonia. Therefore, the current study may have lacked ecological validity in the clinical sense, inhibiting the ability for significant differences to be identified that point towards EA as a mechanism driving anhedonia.

Methodological limitations

The current study has methodological limitations which reduce the generalisability of the findings. The experimental group were the only group that were given emotion regulation instructions, and it is unknown to what degree they may have actually suppressed their emotions specific to the DP instructions. An additional experimental group given acceptance based instructions i.e. to notice any thoughts, emotions and sensations without judging them or resisting them (Hayes Luoma, Bond, Masuda, & Lillis, 2006) may shed further light on the underlying causal mechanism of EA, by allowing a comparison with a theoretically opposite emotion regulation strategy to EA: mindfulness (Hayes et al., 2006, Kashdan et al., 2006).

The memory recall was prior to the imagine tasks, (memory one, imagine one, video, memory two, imagine two) and was not counterbalanced across groups (see Figure 1). The lack of counter balancing may have led to an order effect, whereby any changes in emotional responsivity would have been due to the positive memory recall, and lost by the time the imagine positive future event task started. A lack of counter balancing may have reduced the likelihood of demonstrating changes in emotional responsivity as a result of imagining a future event, compared

to memory recall. Future replication may want to consider including a counter balancing for half of participants to eliminate order effects.

To participate students had to express their interest prior to signing up to the study, and these participants may reflect a bias towards openness to affective experience. Potentially, those that did not request to participate may have higher trait EA and their exclusion may partially explain the low average AAQ-II (Bond et al., 2011) sample mean (mean 18, and scores of 28+ suggest presence of psychological difficulties). The current study may therefore benefit from replication with participants more distributed across the EA trait spectrum.

Clinical Implications

The current findings do not provide support for the unintentional spillover hypothesis; that EA is a mechanism of emotional numbing responsible for anhedonia, in the context of using EA in response to trauma. Recalling positive memories and describing positive future events significantly improved positive subjective emotion experience. Some of the most convincing and recent evidence for anhedonia following EA in response to traumatic stress was identified by Frewen, et al., (2012) who demonstrate negative affective interference in a clinical sample. Therefore, it may be that changes to self-reported valence and sadness to positive stimuli are only apparent in individuals who present with clinical symptoms. Whilst the current findings do not negate the role of EA upon anhedonia, it may be that clearer insights into the causal mechanisms of EA effecting anhedonia may be found using clinical samples.

Future research

Across groups there was an improvement in negative affect following positive stimuli. It may be worth exploring this experimentally by instructing participants to use private positive experiences as techniques following trauma exposure and measuring experiences of negative and positive affect, and intrusions about the trauma video at one week follow up. This design would require a control group that did not process positive experiences, to rule out the possibility of a spontaneous mood repair.

Additionally, it would be informative to repeat the study with a clinical sample of those with a history of trauma. Infact, asking participants to recall a personally salient trauma would provide useful data elucidating the mechanisms leading to changes in emotional reactivity, consistent with previous research examining the impact of dissociation in treatment outcomes (Hagenaars, Minnen, Hoogduin, 2010). Further research has highlighted the benefit, and lack of harm evidenced when using experimental designs with clinical samples, especially for those presenting with anhedonia (Larsen & Berenhaum, 2014). This would allow for clarification of whether the normal positive reactivity during positive memory recall and imagined future events in the current study is representative of the those who present with a wider PTSD symptom range. Despite the null results, there still exists a dearth of research looking at alternative mechanisms explaining why emotional numbing as a form of EA is the largest predictor of developing PTSD symptoms.

Conclusion

This research has provided no support that EA underlies changes to emotional responsivity and anhedonia following trauma exposure. However, findings tentatively suggest that positive memory recall is effective at repairing negative affect following exposure to trauma, regardless of emotion regulation strategy. Due to the present study using a non-clinical, largely homogenous sample it is possible that anhedonia symptoms resulting from EA may be observed with a sample that is more heterogeneous with a history of trauma.

Essentially, this study is the first to examine how more clinically relevant forms of state EA using the DP mode affects positive affect responsivity, and is one of few to explore processes during trauma exposure rather than inferring this retrospectively. However, the results offer no support for the unintentional spillover hypothesis: that an experimentally induced form of EA leads to emotional numbing identified in PTSD.

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Appendices

Appendix A:

Study information sheet

Consent form

Ethical approval letter

Background information sheet

Instructions for positive memory recall and imagined future events

NART

PC-PTSD

Life events checklist

PHQ-9

GAD-7

AAQ-II

Trait PANAS

ERQ

SCHOOL OF PSYCHOLOY:
Doctorate in Clinical Psychology
Study Information Sheet

Researchers:
Claudia Copestake: Doctorate in Clinical Psychology student

Dr. Barney Dunn & Dr. Anke Karl: supervisors

Location:
Psychology
University of Exeter
Washington Singer Building
Perry Rd
Exeter EX4 4QG
01392 264645

Beginning date:
January 2013

Finish date:
June 2014

Who is organising the research?

This research is being conducted by a Trainee Clinical Psychology student, as fulfilment for the research element of the Doctorate in Clinical Psychology at Exeter University. The Psychology department is committed to conducting research to promote practice and research to benefit those with psychological issues.

What is the study about?

In this study we are interested in examining how different emotional regulation strategies can influence subsequent emotional responsiveness when exposed to an analogue trauma induction in an experimental context. We are investigating whether engaging in experiential avoidance when processing traumatic material directly causes emotional numbing when exposed to traumatic material. These findings will help us identify of how traumatic material is initially processed, and increase our understanding of how different emotional responses may influence how the viewed traumatic material is processed. We will also measure how cognitive and personality variables may influence this effect, how fast your heart beats and how much you sweat through your fingertips during the experiment.

The trauma film paradigm has been used in a number of other studies (Holmes & Bourne, 2008) and has been given ethical approval from Exeter University and is therefore deemed suitable for viewing for the purpose of this study.

What will participation in the study involve?

The study takes place in the Psychology department at Exeter University, and involves attending a single session lasting approximately 60 minutes. There will also be some measures and a timetable that you will be asked to complete in the one week following the experiment, for duration of one week. As reward for your participation, you will be put into a draw to win £30 Amazon voucher. If you are a psychology undergraduates you will also be given 2 course credits.

First you will be asked to fill out a series of questionnaires that ask about various aspects of your mood and personality. You will then be asked to imagine a positive future event you would like to happen to you and describe a positive memory from your past

Following the initial completion of questionnaires, your heart rate and how much you sweat through your finger tips will be measured, to measure how your body is responding throughout the experiment. The equipment used to measure how your body responds are safe and comfortable to wear and are not invasive, and involve being stuck to the skin like plasters. This will measure psycho-physiological responses throughout the task. You will

then be asked to either follow a set of instructions, asking you to adopt a particular emotional regulation strategy, or you will not be given any instructions, and asked to watch a video clip. The film will last for approximately 5 minutes, and includes distressing scenes of individuals injured from a bomb explosion. This material is of a distressing nature.
Having watched the film clip, I we will continue to measure how your body is responding. You will also be asked to complete a further set of questions and measures. I will then ask you to describe a positive memory that you might have. Finally, I will ask you to complete a Positive Events Diary over a one week period following the experiment. I will ask you also to complete some additional measures and questionnaires relating to the film clip viewed. You will be given contact details of the researchers should you wish to seek further help or ask questions about any of the material, or if any of the questions highlight any personal difficulties for you, etc. Furthermore, one of supervisors, Dr. Barney Dunn is a trained Clinical Psychologist and is available to provide further advice if necessary.

What will happen to the information you give?

All the information that you provide will be kept in a secure place and will remain confidential, and you are free not to answer any particular question if you do not wish to do so. Your answers to the questionnaires and all data gathered by the computer will be identifiable only through an ID number (and not your name). No one else will see this data apart from the research team and we will not communicate any of this information to anybody else. Your name and contact details will be stored separately from any personal information that you provide on the questionnaires.

What will happen to the results of the study?

Upon completion of the research by August 2014, the researchers will communicate the findings of the study to the wider community of researchers, including academics and clinicians. This is typically achieved through writing up the results in an academic journal, and/or presenting the results at conferences. This will NOT involve any identification of individuals who took part, or any other identifiable information.

What do you do if you want to participate in the study?

If you agree to take part, please indicate this to the researcher who will ask you to complete the informed consent form. Even if you have signed the form, you are free to withdraw from the study at any time and for whatever reason.

Thank you for reading this information sheet. For any more information please contact:

Claudia Copestake
ccc204@ex.ac.uk
Dr. Barney Dunn
B.D.Dunn@ex.ac.uk

SCHOOL OF PSYCHOLOY: Doctorate in Clinical Psychology
Consent Form

Please tick box

1. After reading the Study Information Sheet for the above study I agree to take part. I have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw from the study at any point, without giving a reason. ☐
3. I understand that any information I provide will remain confidential and no identifiable information will be available when the study is complete and the results are disseminated ☐
4. I understand that should I have any questions or concerns at any time, that I have been given the contact details of the researchers and am able to contact them. ☐

Does engaging in experiential avoidance when processing traumatic material directly cause emotional numbing in Post traumatic stress disorder?

Researchers:
Claudia Copestake: Doctorate in Clinical Psychology student

Dr. Barney Dunn & Dr. Anke Karl: supervisors

Location:
Psychology
University of Exeter
Washington Singer Building
Perry Rd
Exeter EX4 4QG
01392 264645

Beginning date:
January 2013

Finish date:
June 2014

Participant name	Date	Signature
_____	_____	_____

Thank you for completing this form.

rom: apache@exeter.ac.uk <apache@exeter.ac.uk> on behalf of Ethics Approval System <D.M.Salway@exeter.ac.uk>
Sent: 14 March 2013 02:36
To: Subject: Your application for ethical approval (2013/310) has been conditionally accepted

Ethical Approval system

Your application (2013/310) entitled Does engaging in experiential avoidance when processing traumatic material directly cause emotional numbing in Post traumatic stress disorder? has been conditionally accepted

Please visit http://www.exeter.ac.uk/staff/ethicalapproval/

Please click on the link above and select the relevant application from the list. The conditions are as follows:

Project details

Conditions of acceptance	This application is approved with the following conditions: • It is good that the nature of the trauma film is explained in the informed consent procedures, but it is unclear whether or not there is any attempt to screen out people with current/past PTSD. This may be an issue in terms of reducing the possibility of distress. Please provide some detail regarding how the researcher will deal with this issue. • Participants will be contacted by phone for the follow-up and later check on distress. There is a risk that participants may not be contactable by telephone, so will miss the debriefing and check. An alternative means of contacting participants should therefore be obtained, to minimise the possibility of them missing this information. It would also be good to send them information about potential sources of support via post/email. • It is unclear from the application how the follow-up diary is collected - please amend the information sheet to make this more clear. Please send by email a single document that describes how you intend to address these issues, to the Chair (c.n.w.burgess@ex.ac.uk) for Chair's Action. You should not commence data collection until you have final confirmation of approval from the Chair, Psychology REC.

Background Information Sheet

All information given will be kept private, confidential and anonymous. Where relevant, please circle the appropriate response. **<u>When completed, please place this form to the researcher.</u>**

Today's date: _____

Identifier: _____

Date of birth: _____

Age: _____ **Gender: M / F** **Ethnicity:** _____

Occupation: _____

NART score _____ Temperature of room _____

Email address _____

Mobile phone number _____

If student, current year: _____

If student, what course are you studying? _____

Do you wear glasses?	Yes	No
Are you colour blind?	Yes	No
Do you have any hearing difficulties?	Yes	No
Have you ever had any neurological problems?	Yes	No
Do you have a previous history of mental health problems?	Yes	No
Have you had any previous psychological therapy?	Yes	No
Do you have any existing medical conditions?	Yes	No
Are you taking medication at the present time?	Yes	No
Have you ever been exposed to a terrorist incident?	Yes	No

If yes to any of the above, please give details, below:

_____
_____
_____
_____
_____
_____
_____

<u>Positive memory and future events</u>

I'm going to ask you to identify TWO positive memories, that I would like you to describe to me out loud, and in detail for one minute during the experiment. These positive memories must be things that were unequivocally positive and that any outsider would agree they were 100% positive.

I will be recording your descriptions using a Dictaphone.

I would like you now to identify what positive memories you are going to use for the experiment. Can you please give a ONE SENTENCE description below of those memories.

e.g. ' My birthday surprise last year where I got taken to Florence for a long weekend'.

Positive memory ONE

Positive memory TWO

I am also going to ask you to identify TWO positive future events that I would like you to describe to me out loud, and in detail during the experiment. These potential future events must be things that you really hope and wish will happen, which are unequivocally positive and that any outsider would agree they are 100% positive.

I would like you now to identify what potential future events you are going to use for the experiment. Can you please give a ONE SENTENCE description below of those events.

e.g. 'Getting married to my partner of X years with all my friends and family there

Positive future event ONE

Positive future event TWO

NART

CHORD

ACHE

DEPOT

AISLE

BOUQUET

PSALM

CAPON

DENY

NAUSEA

DEBT

COURTEOUS

RAREFY

EQUIVOCAL

NAÏVE

CATACOMB

GAOLED

THYME

HEIR

RADIX

ASSIGNATE

HIATUS

SUBTLE

PROCREATE

GIST

GOUGE

SUPERFLUOUS

SIMILE

BANAL

QUADRUPED

CELLIST

FAÇADE

ZEALOT

DRACHM

AEON

PLACEBO

ABSTEMIOUS

DÉTENTE

IDYLL

PUERPERAL

AVER

GAUCHE

TOPIARY

LEVIATHAN

BEATIFY

PRELATE

SIDEREAL

DEMESNE

SYNCOPE

LABILE

CAMPANILE

PC-PTSD

In your life, have you ever had any experience that was so frightening, horrible, or upsetting that, in the past month, you:

Have had nightmares about it or thought about it when you did not want to? YES / NO

Tried hard not to think about it or went out of your way to avoid situations that reminded you of it? YES / NO

Were constantly on guard, watchful, or easily startled? YES / NO

Felt numb or detached from others, activities, or your surroundings? YES / NO

Life Events Checklist

Listed below are a number of difficult or stressful things that sometimes happen to people. For each event, **circle one or more** of the numbers to the right to indicate that: (a) **it happened to you** personally, (b) **you witnessed it** happen to someone else, (c) you learned about it **happening to someone close to you,** (d) you're **not sure** if it fits, or (e) it **doesn't apply** to you.

Be sure to **consider your entire life** (growing up as well as adulthood) as you go through the list of events.

	Event	Happened to me	Witnessed it	Leaned about it	Not sure	Doesn't apply
1.	Natural disaster (for example, flood, hurricane, tornado, earthquake)	0	1	2	3	4
2.	Fire or explosion	0	1	2	3	4
3.	Transportation accident (for example, car accident, boat accident, train wreck, plane crash)	0	1	2	3	4
4.	Serious accident at work, home, or during recreational activity	0	1	2	3	4
5.	Exposure to toxic substance (for example, dangerous chemicals, radiation)	0	1	2	3	4
6.	Physical assault (for example, being attacked, hit, slapped, kicked, beaten up)	0	1	2	3	4
7.	Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb)	0	1	2	3	4

Event		Happened to me	Witnessed it	Leaned about it	Not sure	Doesn't apply
8.	Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm)	0	1	2	3	4
9.	Other unwanted or uncomfortable sexual experience	0	1	2	3	4
10.	Combat or exposure to a war-zone (in the military or as a civilian)	0	1	2	3	4
11.	Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war)	0	1	2	3	4
12.	Life-threatening illness or injury	0	1	2	3	4
13.	Severe human suffering	0	1	2	3	4
14.	Sudden, violent death (for example, homicide, suicide)	0	1	2	3	4
15.	Sudden unexpected death of someone close to you	0	1	2	3	4
16.	Serious injury, harm, or death you caused to someone else	0	1	2	3	4
17.	Any other very stressful event or experience	0	1	2	3	4

PHQ-9	*Over the **last 2 weeks** (or other agreed time period) how often have you been bothered by any of the following problems?*	*not at all*	*several days*	*more than half the days*	*nearly every day*
1.	Little interest or pleasure in doing things	*0*	*1*	*2*	*3*
2.	Feeling down, depressed, or hopeless	*0*	*1*	*2*	*3*
3.	Trouble falling or staying asleep, or sleeping too much	*0*	*1*	*2*	*3*
4.	Feeling tired or having little energy	*0*	*1*	*2*	*3*
5.	Poor appetite or overeating	*0*	*1*	*2*	*3*
6.	Feeling bad about yourself — or that you are a failure or have let yourself or your family down	*0*	*1*	*2*	*3*
7.	Trouble concentrating on things, such as reading the newspaper or watching television	*0*	*1*	*2*	*3*
8.	Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	*0*	*1*	*2*	*3*
9.	Thoughts that you would be better off dead or of hurting yourself in some way	*0*	*1*	*2*	*3*
	PHQ-9 total score =				

GAD-7	*Over the **last 2 weeks** (or other agreed time period) how often have you been bothered by any of the following problems?*	*not at all*	*several days*	*more than half the days*	*nearly every day*
1.	Feeling nervous, anxious or on edge	*0*	*1*	*2*	*3*
2.	Not being able to stop or control worrying	*0*	*1*	*2*	*3*
3.	Worrying too much about different things	*0*	*1*	*2*	*3*
4.	Trouble relaxing	*0*	*1*	*2*	*3*
5.	Being so restless that it is hard to sit still	*0*	*1*	*2*	*3*
6.	Becoming easily annoyed or irritable	*0*	*1*	*2*	*3*
7.	Feeling afraid as if something awful might happen	*0*	*1*	*2*	*3*
	GAD-7 total score =				

AAQ – II

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7
never true	**very seldom true**	**seldom true**	**sometimes true**	**frequently true**	**almost always true**	**always true**

1.	My painful experiences and memories make it difficult for me to live a life that I would value.	1	2	3	4	5	6	7
2.	I'm afraid of my feelings	1	2	3	4	5	6	7
3.	I worry about not being able to control my worries and feelings.	1	2	3	4	5	6	7
4.	My painful memories prevent me from having a fulfilling life.	1	2	3	4	5	6	7
5.	Emotions cause problems in my life	1	2	3	4	5	6	7
6.	It seems like most people are handling their lives better than I am.	1	2	3	4	5	6	7
7.	Worries get in the way of my success.	1	2	3	4	5	6	7

Trait PANAS

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to the word. Indicate to what extent you generally feel this way, that is, how you feel on average.

	Very slightly/ Not at all	**A little**	**Moderately**	**Quite a Bit**	**Extremely**
	1	**2**	**3**	**4**	**5**
Interested	_____				
Distressed	_____				
Excited	_____				
Upset	_____				
Strong	_____				
Guilty	_____				
Scared	_____				
Hostile	_____				
Enthusiastic	_____				
Proud	_____				
Irritable	_____				
Alert	_____				
Ashamed	_____				
Inspired	_____				
Nervous	_____				
Determined	_____				
Attentive	_____				
Jittery	_____				
Active	_____				
Afraid	_____				

Emotion Regulation Questionnaire

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale:

1----------2----------3----------4----------5----------6----------7

Strongly disagree neutral strongly agree

1. ____ When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about

.2. ____ I keep my emotions to myself.

3. ____ When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about

.4. ____ When I am feeling positive emotions, I am careful not to express them.

5. ____ When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm.

6. ____ I control my emotions by not expressing them

.7. ____ When I want to feel more positive emotion, I change the way I'm thinking about the situation.

8. ____ I control my emotions by changing the way I think about the situation I'm in.

9. ____ When I am feeling negative emotions, I make sure not to express them.

10. ____ When I want to feel less negative emotion, I change the way I'm thinking about the situation

Temporal experience of pleasure scale (TEPS)

Below are a list of statements that may or may not be true for you. Please read each statement carefully and decide how true that statement is for you in general. Please respond to all items using the 6 point scale below.

1 2 3 4 5 6
Very false for me
Very true for me

1. When something exciting is coming up in my life, I really look forward to it

_____

2. The sound of crackling wood in the fireplace is very relaxing

_____

3. When I think about eating my favourite food, I can almost taste how good it is

_____

4. I love the sound of rain on the windows when I'm lying in my warm bed

_____

5. The smell of freshly cut grass is enjoyable to me

_____

6. I enjoy taking a deep breath of fresh air when I walk outside

_____

7. I don't look forward to things like eating out at restaurants

_____

8. A hot cup of coffee or tea on a cold morning is very satisfying to me

_____

9. I love it when people play with my hair

_____

10. I really enjoy the feeling of a good yawn

_____

11. When I'm on my way to an amusement park, I can hardly wait to ride the roller coasters

_____

12. I get so excited the night before a major holiday I can hardly sleep

_____

13. I appreciate the beauty of a fresh snowfall

_____

14. When I think of something tasty, like a chocolate chip cookie, I have to have one

_____

15. Looking forward to a pleasurable experience is in itself pleasurable

_____

16. I look forward to a lot of things in my life

_____

17. When ordering something of the menu, I imagine how good it will taste

_____

18. When I hear about a new movie starring my favourite actor, I can't wait to see it

_____

Snaith Hamilton Pleasure Scale

Please rate how much each statement below describes you over the past week.

Definitely Agree (=1), Agree (=2), Disagree (=3), and Definitely Disagree (4)

1. I would enjoy my favourite television or radio programme _____

2. I would enjoy being with family or close friends _____

3. I would find pleasure in my hobbies and pastimes _____

4. I would be able to enjoy my favourite meal _____

5. I would enjoy a warm bath or refreshing shower _____

6. I would find pleasure in the scent of flowers or the smell of a fresh sea breeze or freshly baked bread _____

7. I would enjoy seeing other people's smiling faces _____

8. I would enjoy looking smart when I have made an effort with my appearance _____

9. I would enjoy reading a book, magazine or newspaper _____

10. I would enjoy a cup of tea or coffee or my favourite drink _____

11. I would find pleasure in small things, e.g. bright sunny day, a telephone call from a friend _____

12. I would be able to enjoy a beautiful landscape or view _____

13. I would get pleasure from helping others _____

14. I would feel pleasure when I receive praise from other people _____

Emotional regulation strategy instructions

When watching the film, we would like you to try and change the way that you respond emotionally to what you will see. We would like you to try as hard as you can to suppress, and stop, any emotions that you might experience when you watch the clip. What we mean by this is for you to be as detached as possible, and adopt an unemotional attitude as you watch the clip. If you do experience any emotions, do not show them, and try to keep a straight, blank face at all times. To do this, become unaware of any feelings you do have, and cut them off. Depersonalise the people that you see in the clip, see them as just objects, not meaning anything to you, regardless of what they do.

As you are doing this, see yourself as someone who doesn't experience good or bad emotions, you feel nothing. If people were to try and talk to you, get to know you, think about rejecting them. You don't need anyone in your life, and you don't want to let others near you. As you withdraw and detach yourself from any emotions you experience, and what you are viewing, you might find yourself feeling empty and bored of the clip, distracted by other things in the room, because you are disconnected from what you are seeing. You might feel quite cynical and aloof watching the clip, and regard the events you are viewing in a pessimistic, negative way. Try to behave in a way that if someone was watching you, they would think you looked bored, completely detached from what you're watching, and experiencing no emotions.

Thank you for reading the instructions.

Young-Atkinson Mode Inventory (YAMI; Young et al., 2005)

Listed below are statements that people might use to describe themselves. For each item, please rate **to what extent** you believe or feel each statement **at this current moment** using the 6-point rating scale below.

1 = Never or Almost Never **4 = Often**

2 = Rarely **5 = Much of the time**

3 = Occasionally **6 = Almost all of the time**

---

1. I feel bored. _____
2. I feel empty. _____
3. I feel numb. _____
4. I feel detached. _____
5. I feel flat. _____
6. I feel "spacey." _____
7. I don't care about anything; nothing matters to me. _____
8. I feel indifferent. _____
9. I feel nothing. _____
10. I feel outside of myself or cut off from myself. _____
11. I don't feel connected to other people. _____
12. I don't want to get involved with people. _____
13. I feel distant from other people. _____
14. I feel cold toward other people. _____
15. I want to be alone. _____
16. It's best not to get close or feel attached to other people. _____
17. I don't know what I want or need. _____
18. I don't want to feel anything. _____

Appendix B

Dissemination statement

Dissemination Statement

Following submission I plan to:

- Present the research to other trainees and academic staff at Exeter University and Department of psychology for peer review on 9th June 2014 via a PowerPoint presentation.
- Submit for publication a 5,000 word version of the empirical paper to the target journal (Behaviour research and therapy; BRAT) in the next 6 months
- To possibly present findings in a poster format at an appropriate conference in the next 12 months.

Appendix C

Copy of Instructions for Authors for Behaviour research and therapy target journal (BRAT).r